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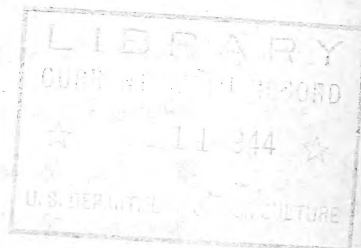
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THE PLANT DISEASE REPORTER

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THE PLANT DISEASE SURVEY, DIVISION OF MYCOLOGY AND DISEASE SURVEY  
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PLANT DISEASE SURVEYS  
IN THE WESTERN UNITED STATES IN 1943

July 1, 1944

The Plant Disease Reporter is issued as a service to plant pathologists throughout the United States. It contains reports, summaries, observations, and comments submitted voluntarily by qualified observers. These reports often are in the form of suggestions, queries, and opinions, frequently purely tentative, offered for consideration or discussion rather than as matters of established fact. In accepting and publishing this material the Division of Mycology and Disease Survey serves merely as an informational clearing house. It does not assume responsibility for the subject matter.

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Supplement 149

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# DISEASES IN NORTH DAKOTA IN 1943<sup>1</sup>

Ian W. Tervet

The crop season of 1943 was very favorable for the growth of all crops, rainfall being abundant throughout the State although somewhat excessive in the south-eastern counties during the earlier part of the growing season. The moist conditions prevailing in the southeastern counties were favorable for the unusually heavy development of pasmo (Mycosphaerella (Sphaerella) linorum) on flax, this disease causing greater loss in 1943 than the usually more destructive rust. Spot blotch (Helminthosporium sativum) and head blight (Helminthosporium spp.) on barley were heavy in the eastern third of the State and caused above average losses. Scab (Gibberella zeae) (G. saubinetii) was most severe on both barley and wheat in the south-eastern counties but was not found west of the Red River Valley. An outbreak of Alternaria solani on potato tubers in 3 localities in the Red River Valley was the most striking disease on potatoes. Late blight was of minor importance in comparison with the losses in 1942.

## DISEASES OF VEGETABLE CROPS

BRASSICA OLERACEA var. CAPITATA, CABBAGE. In one small field in McLean County 50% of the plants were killed by black rot (Xanthomonas campestris) (Bacterium campestre). About 1% loss for the State was estimated from bacterial soft rot (Erwinia carotovora).

CUCUMIS MELO, CANTALOUPE. Anthracnose (Colletotrichum lagenarium) caused somewhat more loss on cantaloupe than is usual, a reduction of about 1% resulting.

LYCOPERSICON ESCULENTUM, TOMATO. Leaf blight (Septoria lycopersici) was present wherever tomatoes were grown. The disease was most severe in the east-central and southeastern sections. Blossom-end rot (physiogenic) occurred generally.

PHASEOLUS VULGARIS, BEAN. Bacterial blight (Xanthomonas phaseoli) caused somewhat higher loss than average, about 4% reduction in yield occurring. Loss from mosaic (virus), about 3%, was similar to that in previous years.

SOLANUM TUBEROSUM, POTATO. Common scab (Actinomyces scabies) was not a severe problem in 1943, serious damage resulting only rarely. Some of the lighter soils in Walsh County had the heaviest infection seen.

A moderate to heavy vine infection by early blight (Alternaria solani) occurred throughout the Red River Valley and reduced yields somewhat. Unusually heavy tuber infections were found in Grand Forks and Walsh Counties.

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<sup>1</sup> The writer expresses his gratitude to Dr. W. E. Brentzel and to Dr. F. Gray Butcher of North Dakota State College for their assistance during the course of the survey.

(*Corticium solani*) see *Pellicularia filamentosa*.

Little change occurred in the bacterial ringrot (*Corynebacterium sepe-donicum*) situation in 1943. Loss was light, a relatively few fields only in the Red River Valley being heavily infected.

Blackleg (*Erwinia phytophthora*) (*E. carotovora*) was favored by the wet and late season and losses were slightly higher in 1943.

Fusarium wilt (*F. oxysporum*) was somewhat less evident than in most years.

Black scurf (*Pellicularia filamentosa*) (*Corticium solani*) caused much less loss than usual.

Late blight (*Phytophthora infestans*). The epidemic of late blight in 1943 was much less severe than in 1942. The most severe vine and tuber infections occurred in eastern Traill, Grand Forks, Walsh, and Pembina Counties. Only Ohios were consistently heavily attacked by tuber rot. At Bismarck, potatoes grown on the Missouri River flats were also heavily attacked by late blight, Ohios, Red Warbas, and Triumphs having many infected tubers. This limited section near Bismarck was the only place in North Dakota outside of the eastern counties where late blight did damage.

Some reduction in yield resulted from hopperburn.

A trace of loss from the virus diseases leafroll and mild mosaic was reported.

Purple top wilt (virus) was found generally in the wetter sections of the State, but heaviest infections occurred in the eastern counties.

#### DISEASES OF CEREALS AND FORAGE CROPS

AVENA SATIVA, OATS. Crown rust (*Puccinia coronata*) was the most important disease on oats in 1943, causing severe damage in the older susceptible varieties. Stem rust (*P. graminis* var. *avenae*), for the State, did no more than a trace of damage, but late-planted fields in the north-central and northwestern parts were heavily infected and suffered some loss. Infection by loose smut (*Ustilago avenae*) and covered smut (*U. kolleri*) (*U. levis*) remained at about the same level as in most recent years, about 1% loss being estimated.

HORDEUM VULGARE, BARLEY. A trace of ergot (*Claviceps purpurea*) occurred.

Seed from Richland County in southeastern North Dakota contained many kernels infected by scab (*Gibberella zeae*) (*G. saubinetii*).

Leaf stripe (*Helminthosporium gramineum*) is not common and is of slight importance, only a few fields containing infected plants.

Spot blotch (*H. sativum*) was severe in the eastern third of the State, and caused some reduction in yield. Usually this disease is of much less importance.

Head blight associated with *Helminthosporium* spp. was common in the eastern third of the State.

A trace of stem rust (*Puccinia graminis*) occurred, and leaf rust (*P. anomala*) was present but did little damage.

Loss from the barley smuts, covered smut (*Ustilago jensenii*) (*U. hordei*) and loose smut (*U. nuda*) was a trace; light infections being found generally in the State.

LINUM USITATISSIMUM, FLAX. Wilt (Fusarium oxysporum f. lini) (F. lini) resulted in a trace of loss. Rust (Melampsora lini) was much less severe than in 1942, very little loss resulting in 1943. Bison was attacked most severely, infections being heaviest in the northern counties and on late-planted flax.

Pasmo (Mycosphaerella (Sphaerella) linorum) was responsible for the greatest reduction in flax yield. It was most severe in the southeastern and east-central sections of the State and caused great injury to much of the yellow-seeded flaxes in these areas. Yellow flaxes on the irrigated lands near Williston in western North Dakota were also heavily attacked.

Browning disease (Polyspora lini) caused very little damage, a trace reduction in yield only being recorded.

The cool wet season of 1943 reduced losses from heat canker (nonparasitic) considerably.

MEDICAGO SATIVA, ALFALFA. Leaf spot (Pseudopeziza medicaginis) had a scattered distribution and was somewhat more abundant than in 1942. Winter injury is normally very important but less than average loss occurred in 1943. A loss of about 6% was estimated.

MELILOTUS ALBA, SWEETCLOVER. Black stem (Ascochyta lethalis), a disease of minor importance normally, increased in severity in 1943.

SECALE CEREALE, RYE. Very little ergot (Claviceps purpurea) was seen; and loss from leaf rust (Puccinia rubigo-vera var. secalis) (P. dispersa) was light.

TRITICUM AESTIVUM, WHEAT. Ergot (Claviceps purpurea) infection was limited to a trace.

A relatively heavy infection of scab (Gibberella zeae) (G. saubinetii) was seen in the Red River Valley, but little or none occurred west of the Valley.

The development of root and foot rots associated with Helminthosporium sativum was favored by heavy rains. Some reduction in yield resulted from head blight, especially in the wetter regions of the Red River Valley.

Stem rust (Puccinia graminis var. tritici) caused very little loss in 1943, only light infections occurring. Leaf rust (P. rubigo-vera var. tritici) (P. tritici) resulted in less than average injury.

Bunt (Tilletia foetida (T. levis) and T. caries (T. tritici)) occurred in scattered infections.

Black chaff (Xanthomonas translucens f. sp. undulosa) was severe in the Red River Valley.

Wet weather at harvest caused considerable damage in the Red River Valley.

ZEA MAYS, CORN. Stalk rot caused by Fusarium spp. was less severe than usual. Smut (Ustilago maydis) (U. zeae) caused about 2% reduction in field corn and about 3% in sweet corn.

#### DISEASES OF MISCELLANEOUS HOSTS

BETA VULGARIS, SUGAR BEET. Cercospora leaf blight (C. beticola) was present in sugar beets in Cass County adjacent to the Red River. Infection was light and developed at the end of August, too late for any appreciable loss to the crop.

FRAGARIA, CULTIVATED STRAWBERRY. Loss from strawberry leaf spot (Mycosphaerella fragariae) did not exceed a trace.

FRAXINUS PENNSYLVANICA var. LANCEOLATA, GREEN ASH. A severe infection of Puccinia peridermiospora occurred in southeastern North Dakota.

MALUS SYLVESTRIS, APPLE. Fireblight (Erwinia amylovora) and scab (Venturia inaequalis) occurred in heavier than average epidemics.

POPULUS spp. Very heavy infections of rust (Melampsora medusae) were found on cottonwood, P. deltoides, throughout the Red River Valley. Cytospora chrysosperma causing canker of poplar, P. tremuloides, was found in scattered localities.

PRUNUS spp. Plum pockets (Taphrina communis) was noted on plum, (P. americana) and on cherries.

RHAMNUS spp., BUCKTHORN. Very severe infection of crown rust (Puccinia coronata) occurred on buckthorns in 1943.

RUBUS STRICOSUS, RASPBERRY. Very little loss resulted from mosaic (virus).

### DISEASES IN SOUTH DAKOTA IN 1943<sup>1</sup>

Ian W. Tervet

Unusually severe infections of certain diseases on field crops were seen in 1943. The bacterial leaf blights on cereals and grasses were very evident, and loss from these diseases was greater than usual. The lack of critical experimental work on the losses resulting from leaf-infecting pathogens such as Pseudomonas (Phytomonas) coronofaciens makes any attempt to estimate reduction in yield a matter of opinion. The pasmo disease of flax unquestionably caused a material reduction in yield of flax in eastern South Dakota but again lack of experimental evidence makes any accurate estimate of losses extremely hazardous.

A very heavy infection of Septoria lycopersici reduced tomato yields considerably; adequate control measures have not been developed and continuation of favorable conditions for epidemics of this disease will result again in severe losses to tomatoes.

Corn was freer from ear rots than in other recent years, loss being relatively slight.

### DISEASES OF VEGETABLE CROPS

BETA VULGARIS, BEETS. Aphanomyces cochlioides, Pythium aphanidermatum, P. ultimum, and Rhizoctonia solani, associated with damping-off and root rots, caused some reduction in stand of sugar and table beets.

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<sup>1</sup> The writer acknowledges his gratitude to Dr. W. F. Buchholtz of South Dakota State College for his kind assistance during the course of this survey.



LYCOPERSICON ESCULENTUM, TOMATO. Loss from leaf blight (Septoria lycopersici) was very heavy, the severe defoliation resulting in much low quality sunscalded fruit. Bacterial spot (Xanthomonas vesicatoria) while common on fruits in eastern South Dakota, was not especially severe. Sunscald of the fruits followed defoliation from leaf blight.

PHASEOLUS VULGARIS, BEAN. Bacterial blight (Xanthomonas phaseoli) was noted.

SOLANUM TUBEROSUM, POTATO. Common scab (Actinomyces scabies) was general in the potato section of eastern South Dakota and was severe in many fields in that area. Somewhat less scab was found in Clark County than in eastern Codington and Deuel Counties.

Early blight (Alternaria solani) was common in the principal potato section surrounding Watertown.

(Corticium solani) see Pellicularia filamentosa.

While bacterial ringrot (Corynebacterium sepedonicum) was not observed by pathologists of the South Dakota State College or by the writer, it is probable that some lots of seed are infected. However, no loss from this disease has been observed this year.

Blackleg (Erwinia phytophthora) (E. carotovora) was not uncommon in most fields in eastern South Dakota but losses were slight.

Wilt (Fusarium oxysporum) caused slight loss.

Rhizoctonia canker and black scurf (Pellicularia filamentosa) (Corticium solani) caused slight loss.

Late blight (Phytophthora infestans). A light to moderate vine infection of late blight occurred in eastern South Dakota, but tuber infection was rather more severe than had been expected. Most tuber infection was found in Deuel, Brookings, and Hamline Counties, and the eastern half of Codington County. Only occasional infected tubers were found in the drier potato sections in western Codington and Clark Counties.

All fields showed extensive hopperburn with some loss from this disease.

Most fields of table stock potatoes were rather heavily infected with mosaic (virus) and losses from this disease were high. Spindle tuber (virus) also was common in much of the table stock potatoes.

#### DISEASES OF CEREALS, GRASSES, AND FORAGE CROPS

AGROPYRON SMITHII, WESTERN WHEAT GRASS. Claviceps purpurea, Puccinia graminis, and P. rubigo-vera, each caused slight damage.

AVENA SATIVA, OATS. Halo blight (Pseudomonas coronafaciens) was present in most oat fields, somewhat more commonly than usual, and caused some reduction in yield, but loss was much less than that caused by crown rust. Crown rust (Puccinia coronata) was the major disease on oats and caused severe injury to much of the crop. Stem rust (P. graminis var. avenae) did some damage in the east-central part of the State, but for the State as a whole loss was slight. Smuts (Ustilago avenae and U. kolleri (U. levis)) were found in most fields and losses remained at about the same level as in recent years.

BROMUS INERMIS, BROME GRASS. Bacterial blight (Pseudomonas coronafaciens var. atropurpurea) was heavy on most brome grass in eastern South Dakota. Infection by Selenophoma bromigena was very light and damage negligible.

**HORDEUM VULGARE, BARLEY.** A very severe epidemic of scab (Gibberella zeae) (G. saubinetii) occurred in the eastern counties; in the central and western sections of the State little scab developed.

Very little leaf stripe (Helminthosporium gramineum) occurred.

Severe damage to barley resulted throughout eastern South Dakota from the spot blotch fungus (Helminthosporium sativum). In addition to severe head blight, yield was reduced because of seedling blight, root rot, stem and leaf infections.

There was some stem rust (Puccinia graminis) but damage was slight; and leaf rust (Puccinia anomala) was generally present but also did little damage.

Loose smuts (Ustilago medians and U. nuda) were found to a limited extent in most fields, Dryland and Spartan being the most susceptible varieties.

Bacterial blight (Xanthomonas translucens) caused some reduction from shrivelling of the leaves. The disease was found in all barley-producing areas.

**LINUM USITATISSIMUM, FLAX.** Rust (Melampsora lini) was less severe in 1943 than in the previous year. Late-planted flax in the northeastern section suffered most. Very heavy losses from pasmo (Mycosphaerella (Sphaerella) linorum) resulted throughout eastern South Dakota, the greatest intensity of the disease occurring in Deuel County. Loss from pasmo markedly exceeded that from rust, and it was fortunate that yellow flaxes were not grown in South Dakota in 1943.

**MEDICAGO SATIVA, ALFALFA.** Leaf spot (Pseudopeziza medicaginis) caused slight injury on second-growth alfalfa in the eastern part of the State.

**SECALE CEREALE, RYE.** Very little ergot (Claviceps purpurea) was seen, and no stem rust (Puccinia graminis). Heavy leaf rust (P. rubigo-vera var. secalis) infection was responsible for greatest reduction in yield of rye. Heavy leaf infection by bacterial blight (Xanthomonas translucens f. sp. secalis) reduced the yield somewhat.

**SOJA MAX, SOYBEAN.** Most fields were lightly to moderately attacked by bacterial pustule (Xanthomonas phaseoli var. sojense).

**SORGHUM VULGARE, SORGHUM.** Bacterial stripe (Pseudomonas andropogoni) occurred in the southeastern counties, where practically every field had light to moderate infection with injury especially to the lower leaves. Covered smut (Sphacelotheca sorghi) could be found in most fields, the reduction in the crop being approximately 10%.

**SORGHUM VULGARE** var. **SUDANENSE, SUDAN GRASS.** Bacterial spot (Pseudomonas holci) was general in southeastern South Dakota, many leaves being killed by it.

**TRIFOLIUM PRATENSE, RED CLOVER.** Weather conditions did not favor development of northern anthracnose (Kabatiella caulivora), although the fungus was found in all fields of red clover examined in the southeastern part of the State.

**TRITICUM AESTIVUM, WHEAT.** Scab (Gibberella zeae) was prevalent in the eastern counties. Some loss also resulted from seedling blight and foot rot due to this fungus.

Seedling blight, foot rot, and head blight caused by Helminthosporium sativum were more generally distributed than similar infection by Gibberella.

Heavy infections of stem rust (Puccinia graminis var. tritici) were seen in central South Dakota on a few fields of Marquis wheat and in the northeastern part of the State on a few fields of black durum, but loss for the State as a whole did not exceed a trace.

The epidemic of leaf rust (Puccinia rubigo-vera var. tritici) (P. tritici) was lighter than normal.

Slight loss probably resulted from leaf infections by Septoria tritici.

Very little bunt (Tilletia foetida) (T. levis) was found.

Black chaff and leaf blight (Xanthomonas translucens f. sp. undulosa) were generally distributed and caused some loss.

ZEALY MAYS, CORN. Diplodia zeae, Fusarium spp., Gibberella zeae, and Nigrospora sphaerica were associated with ear rots. Unusually little ear rot was seen. Fusarium foot rot caused some injury especially on sweet corn. Fusarium stalk rot was most common and destructive. Diplodia was less important. Rust (Puccinia sorghi) was present in most fields but the infection was light and loss negligible. Smut (Ustilago maydis) (U. zeae) was widespread but did little damage.

#### DISEASES OF MISCELLANEOUS HOSTS

FRAXINUS PENNSYLVANICA var. LANCEOLATA, GREEN ASH. Gloeosporium sp. causing leaf spot was common throughout the eastern part of the State. Very heavy infection by rust (Puccinia peridermiospora) was seen in most plantings in northeastern South Dakota.

MALUS SYLVESTRIS, APPLE. Erwinia amylovora, Gymnosporangium juniperi-virginianae, and Venturia inaequalis were present in eastern South Dakota wherever apples were grown, but were not so common as in 1942.

POPULUS DELTOIDES, COTTONWOOD. Infection by rust (Melampsora medusae) in 1943 was much later and somewhat less than in 1942.

PRUNUS BESSEYI, SAND CHERRY. Taphrina sp. was noted on this plant.

#### NOTES ON DISEASES OBSERVED IN THE NEBRASKA PLANT DISEASE SURVEY, AUGUST TO NOVEMBER, 1943

Stuart M. Pady

SOJA MAX, SOYBEAN. Bacterial pustule (Xanthomonas phaseoli var. sojense) was found in 26 out of 27 fields. While most leaves had a few pustules very few were sufficiently heavily infected to cause very much defoliation. Because weather conditions were not conducive to the spread of this disease, it is not considered that it caused very much damage.

Pod and stem spot (cause unknown). These spots are found on the stems and pods; fruits are deformed and produce no seeds. The spots are black, 3 to 4 mm long, roughly elliptical, shiny, somewhat sunken. They are found rather commonly in Nebraska and Kansas, appearing as the stems begin to mature. No fruiting bodies of a fungus have been found in the spots, although in one case immature bodies were seen. This disease could cause much damage. Fortunately most of the spots occurred on the stems. (See also Kansas report).

Mosaic (virus) was found on a few plants in a few fields. One late-planted field showed 10 to 15% infection. Mosaic does not appear to be a serious disease in Nebraska.

In one field dead stalks were found with the typical fruiting bodies of the anthracnose fungus (Glomerella glycines). Since the field had long since been harvested, the fungus apparently had been growing saprophytically.

Although none was found during the growing season, charcoal rot (Sclerotium bataticola) was present in 2 fields causing the complete rotting of the stubble. In these cases it was clearly a saprophyte.

SOLANUM TUBEROSUM, POTATO. A tuber rot of unknown cause was found in irrigated fields in the Loup and Platte River Valleys in 5 counties. Although loss in one field was 15% the average loss was estimated to be between 3 and 4%. (See PDR 27(17): 375, Sept. 15, 1943).

SORGHUM VULGARE, SORGHUM. Charcoal rot (Sclerotium bataticola) was not abundant on the milo group of sorghums, being found in small amounts in 5 of 25 fields. One field only showed considerable rot, principally confined to one area where there was 34%. It was estimated that loss from this disease in sorghums would not be more than 2%.

Most farmers apparently treat their seed since kernel smut (Sphacelotheca sorghi) was found in only 7 fields, in 4 of them with percentages less than 2. One field only had a relatively high amount, 48%. The estimated loss from smut is 3%.

Weak-neck (genetic) appears to be more abundant where plants have been sown too thickly and where moisture is lacking. It was found in 11 out of 25 fields. Breaking-over of the peduncle was just beginning in most fields.

Bacterial streak (Xanthomonas holcicola) was observed in 2 fields in western Nebraska. It was not serious nor abundant.

ZEA MAYS, CORN. Charcoal rot (Sclerotium bataticola) was the most serious corn disease. It was found in 40 counties, infection being greater in central and western counties where it averaged 29%, and less in eastern counties where the average was 2%. The amount of disease seems to be correlated with low moisture conditions and high temperatures. The disease causes considerable lodging and may also result in decreased yields. The estimated loss over the State was 16%.

Diplodia stalk rot (Diplodia zeae) was found in 27 of the eastern counties. This disease increases in amount eastward, the highest percentages being found in the 2 eastern tiers of counties. The higher moisture and freedom from burning winds probably account for the higher percentages in these counties. The loss was estimated at 19%.

Smut (Ustilago maydis) (U. zeae) was widely distributed in 46 counties. Counts made in 56 fields in 40 counties showed an average loss of 8%.

Ear rots. Higrospora oryzae cob rot is not especially serious except in some areas in the eastern counties. Secondary ears were highly susceptible. Loss from this disease based on counts in 9 eastern counties is 4%. Diplodia zeae, according to growers, caused less moldy ears than last year. The loss is estimated at 2%, which is low when the high percentage of Diplodia stalk rot in these same counties is considered. It is probable that many ears were infected without showing external symptoms.



The percentage of infection would probably be greatly increased if germination tests were made. Ear rot caused by Fusarium moniliforme was not abundant, the amount being 1%. This organism, along with others, was found following ear-worm injury in 7% of the ears examined.

Rust (Puccinia sorghi), although found in 15 counties, did not occur on many plants nor in large amounts.

Stalk rot (? Fusarium moniliforme). This organism was isolated from corn stalks that had died prematurely from stalk rot in one field in Antelope County.

Bacterial leaf spot and top rot, caused by a bacterium not yet identified. This may be a new disease. The leaf spot was first found in Kansas and material was sent to the Division of Cereal Crops and Diseases for study. The spots are characteristic: pale brown, linear, with narrow reddish-brown margins. It is believed that this organism also causes a top rot of the young plants; several such affected plants were found in Kansas, but none in Nebraska. The leaf spot was found in 5 fields in 5 eastern counties in Nebraska, in small amounts. (See also Kansas report).

Root rot, cause unknown. The roots rotted away, often leaving a hollow cortex. Sometimes small elongated black bodies suggestive of incipient fruiting bodies are found on the roots. Reddish discolorations are often associated. Some of the root rot in the 14 counties is probably charcoal rot prior to formation of sclerotia. In specimens of similarly affected plants sent to him from Kansas Dr. W. W. Ray found 100% Fusarium moniliforme in isolations from vascular bundles of the stems.

#### NOTES ON THE PLANT DISEASE SURVEY IN KANSAS,

AUGUST TO NOVEMBER, 1943

Stuart M. Pady

SOJA MAX, SOYBEAN. Bacterial pustule (Xanthomonas phaseoli var. sojense) is the commonest soybean disease in the State, being found wherever soybeans are grown. Although heavy infections caused some defoliation, weather conditions were apparently unfavorable for the spread of the disease and it did not appear to be causing very much damage in 1943. There is good evidence that the disease is seed-borne, since the greatly increased acreage in 1943 meant that many fields were being grown far from fields where soybeans were grown last year.

Pod and stem spot, cause unknown, was widely distributed, appearing mostly on the stems as the plants begin to mature. When present on the pods seed does not form. No fungous fruiting bodies have been found associated although one collection on old dead stems had immature fruiting bodies present. This disease is definitely not pod and stem blight. Since the disease could easily be very serious, it is one that will bear watching. (See also Nebraska report).

Pod and stem blight (Diaporthe sojae) appears very late and was found this year only on dead stalks following harvest. It is certainly not a serious disease in this State and may be saprophytic.

Anthrachnose (Glomerella glycines) was found in a few localities in small amounts on old dead stems, late in the season. It appears to be a saprophyte.

Charcoal rot (Sclerotium bataticola) has been found only on the dead root stocks after growth had been completed. It was widely distributed in 16 counties. The amount depends upon the variety, early-maturing sorts having the highest percentages. In these plants the root system is completely destroyed. Although living plants are reported to have been killed by the fungus in Illinois, none were found affected in Kansas during the growing season.

Mosaic (virus) was found on a few plants in small amounts.

SORGHUM VULGARE, SORGHUM. Milo disease, cause not definitely known. A survey for this disease was made in the western half of the State. In some cases, as when the plants are killed prematurely, it is evident that milo disease is present, but in older plants the symptoms may be confused with drought effects and charcoal rot and the only reliable means of identification is to take a soil sample and make a greenhouse test. Fifty-two such samples were taken from 37 counties. The results of this test are given in PDR 28(10):356-358, Apr. 22, 1944. Loss would not average high since most growers in southwestern and south-central counties use resistant varieties, especially Westland.

Charcoal rot (Sclerotium bataticola) was rather serious, being found in 20 counties, with amounts ranging from a trace to 100% in localized areas. Lodging was becoming increasingly evident. All varieties appeared to be about equally susceptible. Early symptoms (prior to formation of sclerotia) are identical with those of milo disease.

Kernel smut (Sphacelotheca sorghi), in general, was not serious and was found in only 15% of the fields visited, averaging 6%.

Weak-neck (genetic) was present in 27 counties, mostly in the early stages, with off-color heads and brown rachis. In the later stages the discoloration extends to the base of the peduncle and the head breaks over. The variety Colby was found to be very susceptible to breaking-over, while Wheatland and Westland tended to resist it. Thick planting and drought are predisposing factors.

Bacterial streak (Xanthomonas holcicola) although found in 11 counties, was not present in any great amount and did not appear to cause any damage. Bacterial stripe (Pseudomonas andropogoni) was not common or serious.

ZEA MAYS, CORN. Charcoal rot (Sclerotium bataticola), which appears to be the most serious corn disease of 1943, is found abundantly wherever corn is grown except in the northeastern counties. In the northeastern counties the amount was about 6%, in the southeastern and south-central counties 11%, and in the north-central counties 40%. The average for the State is 20%, based on counts made in 70 fields in 38 counties. (Table 1). This disease causes a very high degree of lodging, and if the plant is attacked early there may also be considerable reduction in yield. The distribution of charcoal rot appears to be correlated with low rainfall and high temperatures, which accounts for the high percentages in the central counties and low percentages in northeastern counties (Table 1). There is less rot also in the bottom lands; in the north-central counties upland fields averaged 49%, bottom lands 38%.

Table 1. Relationship between precipitation and Diplodia stalk rot and charcoal rot of corn in Kansas, 1943

Area	County	Precipitation	Diplodia	Charcoal
		: June - October:	stalk rot	rot
		: inches	: %	: %
1 Northeast	: Leavenworth	: 29.27	: 54	: 2
	: Jefferson	: 22.43	: 26	: 0
	: Atchison	: 21.02	: 17	: 0
	: Doniphan	: 20.83	: 39	: 0
	: Brown	: 18.94	: 59	: trace
	: Marshall	: 18.87	: 26	: 46
	: Nemaha	: 18.76	: 44	: 2
	: Pottawatomie	: 17.99	: 19	: 12
	: Jackson	: 17.07	: 26	: 8
Average for area		: 20.57	: 34	: 6
2 South- central; Southeast	: Osage	: 25.47	: 28	: 6
	: Neosho	: 25.12	: 5	: 29
	: Anderson	: 24.64	: 35	: 9
	: Shawnee	: 24.28	: 15	: 2
	: Linn	: 22.88	: 28	: 2
	: Franklin	: 22.48	: 35	: 4
	: Douglas	: 22.34	: 39	: 1
	: Lyon	: 20.51	: 18	: 6
	: Miami	: 20.30	: 85	: 6
	: Johnson	: 19.73	: 15	: 0
	: Allen	: 18.83	: 8	: 4
	: Chase	: 17.90	: 38	: 18
	: Butler	: 15.34	: 40	: 10
Average for area		: 21.49	: 30	: 11
3 North- central	: Riley	: 25.10	: 2	: 34
	: Clay	: 20.46	: 6	: 58
	: Marion	: 18.21	: 1 ?	: 60
	: Republic	: 16.72	: 25	: 26
	: Washington	: 16.30	: 0	: 20
	: Rooks	: 14.59	: 1	: 62
	: Cloud	: 13.86	: 14	: 19
	: Jewell	: 12.78	: 4	: 32
	: Mitchell	: 12.46	: 5	: 50
	: Phillips	: 12.27	: 2	: 58
	: Osborne	: 11.61	: 0	: 32
	: Smith	: 9.58	: 1	: 55
Average for area		: 15.32	: 6	: 40
Eastern third of State		: 20.93	: 32	: 8
Middle third of State		: 14.29	: 6	: 40

Diplodia stalk rot (Diplodia zeae) ranks second in importance in the State. It is widely distributed, increasing in amount to the eastward. In the north-central counties it averages 6%; in north-eastern counties 34%. The loss for the State, based on counts made in 38 counties in 70 fields, is 22%. There is much less lodging with this stalk rot than with charcoal rot, and although the amount of infection is higher, it is believed that the loss is not so great. The ears on infected plants did not, for the most part, appear to be poorer than those on healthy plants. The highest percentages of this disease were found in counties receiving greatest rainfall, thus providing favorable conditions for infection. Table 1 shows the relationship between the amount of precipitation and the prevalence of Diplodia stalk rot and of charcoal rot. It will be seen that conditions favoring Diplodia are just the opposite of those favoring charcoal rot.

Other stalk rots are sometimes found, with pink or red discolorations in the tissues. Isolations by Dr. W. W. Ray yielded Fusarium moniliforme and Gibberella zeae (G. saubinetii).

Smut (Ustilago maydis) (U. zeae) was found wherever corn is grown. Counts made in 17 fields in 14 counties gave an average of 3% infection.

Bacterial leaf spot and top rot, causal organism not identified. This disease was observed first in Douglas County. In efforts made to determine the extent of its distribution, leaf spot was located in 7 additional counties; top rot was found in a few cases. In most fields the spotting is not severe. The heaviest infection was found in seed-producing blocks especially in Jewett Hybrids being grown at Sabetha. The disease was not serious in 1943 (See also the Nebraska report).

Rust (Puccinia sorghi) was found in small amounts in 4 counties. Damage was not severe.

Ear rots were not abundant in 1943, as shown by counts made in 25 counties. Cob rot (Nigrospora oryzae) was found in practically every county in small amounts; the average was 2%. It was fairly common on secondary ears. Diplodia ear rot (Diplodia zeae) was not abundant either in cribs or in the field. In general this ear rot was more prevalent in the north-eastern counties where moisture conditions favor infection. Considering the high percentage of Diplodia stalk rot in these counties, it is surprising that the amount of Diplodia ear rot was so low, averaging 2% for the State. Many ears are probably infected but show no external symptoms and the disease would show up only on the germinator. Fusarium ear rot (F. moniliforme) was not abundant, being found in amounts averaging 0.5% for the State. Following ear worm injury, however, this fungus is prevalent, although other fungi may also be present. Ten percent of all the ears examined had Fusarium and other fungi following insect injury at the tips.

Root rot, cause not known. Affected plants are usually prematurely killed and the stalk tissues often show disintegration. The plants are easily pulled out of the ground. The stalks often have pink or black mycelium within. The rotted roots sometimes have black elongated bodies on the surface, suggestive of immature fruiting bodies. Often the roots are red in color. Some of these symptoms are probably caused by charcoal rot, but sclerotia are not present. In one field observed in Jewell County 82% of the plants were lodged; 20% of the lodging was due to charcoal rot and 4% to Diplodia, while many plants were affected by a root rot with no evidence of either of these diseases. From specimens sent to him from this field, Dr. W. W. Ray isolated 100% Fusarium moniliforme (See also Nebraska report).

## SUMMARY REPORT OF PLANT DISEASES IN OKLAHOMA, 1943

Howard W. Larsh with assistance of Oklahoma state  
plant pathologists and crop specialists

### INTRODUCTION

The 1943 season in Oklahoma was strikingly abnormal in several respects, as seen in the following meteorological data:

<u>Month</u>	<u>Mean</u> <u>temperature</u> °F	<u>Departure from</u> <u>long-time average</u>	<u>Mean</u> <u>precipitation</u> inches	<u>Departure from</u> <u>long-time average</u>
Jan.	38.6	+ 0.4	0.08	- 1.34
Feb.	47.0	+ 6.9	0.63	- 0.77
Mar.	46.0	- 4.6	2.01	- 0.11
Apr.	64.3	+ 3.9	2.33	- 1.13
May	66.8	- 1.5	<u>10.27</u>	<u>+ 5.52</u>
June	79.5	+ 2.3	2.76	- 1.15
July	84.0	+ 3.2	0.96	- 1.81

The unprecedented rainfall of May, which resulted in widespread floods, was preceded by a severe late winter and spring drought, and was followed by drought throughout the summer which was accentuated by abnormally high summer temperatures.

These highly irregular but clear-cut deviations from normal Oklahoma weather were responsible for the most outstanding features of the pathological picture for Oklahoma in 1943: (1) disastrous flood damage to corn, and the necessity of replanting corn, cotton, peanuts, and other summer crops at unfavorably late dates; (2) midsummer drought as the principal loss factor in sweetpotatoes, peanuts, cowpeas, corn, and cotton; and (3) unusual destructiveness of fungous diseases that depend largely on May rainfall for their development, and almost total absence of certain other diseases that are dependent for their development on moisture before or after May. Thus, for example, apple scab, normally of little consequence in Oklahoma, was epiphytotic and more destructive than in many years, while elm leaf spot, which causes serious defoliation nearly every year in this State, was hardly noticeable. March was a colder month than February in 1943, which was a decisive factor in inhibiting the development of wheat leaf rust and crown rust of oats to such an extent that no serious loss resulted, although the May rains enabled these rusts to become quite noticeable at harvest time in June.

In future attempts to correlate the incidence of plant diseases with meteorological conditions, analysis of the season of 1943 in Oklahoma may be expected to yield unusually clear-cut evidence of the dependence of certain diseases on rainfall before, during, or after May respectively.—(K. Starr Chester).

## DISEASES OF VEGETABLE CROPS

ALLIUM CEPA, ONION. Scattered reports indicate that bulb rots (Botrytis allii, Erwinia carotovora, and Fusarium spp., principally) were as destructive as usual, accounting for losses of 25% to 75% of onions placed in uncooled storage for the summer. (Chester)

ASPARAGUS OFFICINALIS, ASPARAGUS. Cercospora stem spot (C. caulicola) was not observed to be responsible for killing back stems and branches of asparagus in the fall as in 1942, although searched for in the same planting. The disease appears late in the season, after the main period of food storage, and is probably relatively non-injurious. (Chester).

BETA VULGARIS, BEET. Leaf spot (Cercospora beticola), the only beet disease of even moderate importance in Oklahoma, was much less noticeable than usual. (Chester)

CAPSICUM FRUTESCENS, PEPPER. Fruit spot (Alternaria sp.) was very apparent in all plantings, causing an estimated loss of nearly 5% in the most severely infested plantings. Wilt (Verticillium albo-atrum) was observed causing a loss of nearly 15% in 2 plantings. Other plantings were affected less severely.

CITRULLUS VULGARIS, WATERMELON. Anthracnose (Colletotrichum lagenarium) was well distributed in the watermelon-growing regions of the State. One planting had an infestation of nearly 30%. Blossom-end rot (Diplodia sp.) was extremely prevalent this year. Many fruits were lost due to early Diplodia infections. Secondary organisms were apparent in the lesions made by Diplodia. Wilt (Fusarium oxysporum f. niveum) (F. bulbigenum var. niveum) caused up to 15% loss in plantings of susceptible varieties on infested soil. Fusarium wilt was well-distributed in the principal watermelon-growing regions of the State. Many fields have been abandoned because the soil is so heavily infested with the wilt organism.

CUCUMIS MELO, CANTALOUPE. Leaf blight (Alternaria cucumerina) (Macrosporium cucumerinum) was present in most of the plantings in the State. Because of the dry hot weather little loss was sustained. Bacterial wilt (Erwinia tracheiphila) was very serious in 2 large plantings. Nearly 100% loss was observed in one case in southeastern Oklahoma; other plantings revealed losses of plants up to about 5%.

CUCUMIS SATIVUS, CUCUMBER. Leaf blight (Alternaria cucumerina) caused necrotic leaf spots in several plantings. Nevertheless, the most severe infections did not reduce the leaf surface more than 1%. Adverse weather conditions prevented the development and dissemination of the causal organism.

Specimens revealing typical symptoms of downy mildew (Pseudoperonospora cubensis) were difficult to locate. Early infections were observed on 3 or 4 plants but the infection failed to develop to the point where loss was more than negligible. The inoculum was present early in the season but climatological conditions prevented the development and spread of the disease.

Bacterial wilt (Erwinia tracheiphila) was less prevalent on cucumbers than on cantaloups. A loss of nearly 1% was apparent in one late planting of cucumbers.

IPOMOEA BATATA, SWEETPOTATO. Two plants were observed killed by Java black rot (Diplodia tubericola); however, these plants had grown from an infected root stock.

Black rot (Endoconidiophora (Ceratostomella) fimbriata) was observed in 2 plantings during 1943. The loss was limited to 4 plants in one planting and 2 in the other. The certified plant program has aided considerably in reducing the amount of black rot on sweetpotatoes in Oklahoma.

Stem rot or wilt (Fusarium oxysporum f. batatas) (F. bulbigenum var. batatatis) was the most widespread and prevalent disease of sweetpotato during 1943 in Oklahoma. Several plantings were observed in which a loss of 2 or 3% was not at all uncommon. Losses in some of the more severely attacked plantings were greater than 10%.

Considerable loss in sweetpotato culture resulted from the extreme drought this season. Sweetpotato leaves suffered a large reduction in the content of chlorophyll. All plantings with the exception of those which were irrigated showed yellowed leaves.

LYCOPERSICON ESCULENTUM, TOMATO. One of the 3 most prevalent diseases of tomatoes in Oklahoma in 1943 was Fusarium wilt (F. oxysporum f. lycopersici) (F. bulbigenum var. lycopersici). Several plantings were observed in which the loss was over 5%. Varieties that have been more or less resistant revealed wilted plants this season.

Early infections by leaf spot (Septoria lycopersici) caused severe defoliation in some regions of the State. However, late infections were prevented by adverse weather conditions. In irrigated plantings infections were severe and caused considerable defoliation.

Bacterial canker (Corynebacterium michiganense) was observed in 2 plantings; however, only 4 or 5 plants were infected.

Infection by the rootknot nematode (Heterodera marioni) was observed in all sections of the State. Considerable damage was inflicted to commercial plantings, as well as comparable losses in home gardens. This is probably the most serious disease of tomato, considering the State as a whole.

Mosaic(virus) was widespread in Oklahoma but caused very little damage. In most of the plantings the infection was limited to only a few plants.

Blossom-end rot (physiogenic) probably caused the greatest loss in tomatoes this season. It was not at all uncommon to see from 1/8 to 1/4 of the fruits affected.

Red spiders were very destructive to tomato foliage in June and July.

PHASEOLUS AUREUS, MUNG BEAN. Leaf and pod blight (Xanthomonas phaseoli) was prevalent on leaves and pods. Defoliation could be detected in most of the plantings observed. In some instances pods were attacked severely. A loss of from 5 to 10% of the leaf area was observed in some plantings.

Yeast spot (Nematospora coryli). Mung beans collected from plantings at Enid and Stillwater revealed yeast spot infections. As in soybeans this particular disease may be more widespread than present reports indicate.

Dry root rot (charcoal rot) (Macrophomina phaseoli=Sclerotium bataticola). Early plantings of mung beans revealed considerable loss due to the sclerotial stage. Losses of 2 to 3% were not at all uncommon in early plantings.

PHASEOLUS LUNATUS, LIMA BEAN. Colletotrichum blight (C. truncatum) was observed on and in mature pods and on the seeds. The conidia developed after picking while the pods were drying. Blight was associated



with a cottony leak disease caused by a species of Pythium. Powdery mildew (Erysiphe polygoni), which was very common in 1942, was practically absent this year. Some Cercospora leaf spot (Cercospora cruenta) was observed. The dry root rot caused by Macrophomina phaseoli was present late in the season. None of these diseases was responsible for much loss.

PHASEOLUS VULGARIS, BEAN. In the early and middle parts of the season the effects of diseases were obscured by widespread destruction by bean leaf beetles followed by red spider injury in June. Bacterial blight (Xanthomonas phaseoli) did not appear to be as prevalent as usual. Toward the end of the season many plantings were brought to an untimely end by dry root rot caused by Macrophomina phaseoli. (Chester).

PISUM SATIVUM, ENGLISH OR GARDEN PEA. Poor stands with non-treated seed were experienced by gardeners this year. The cause was probably due to Pythium spp. and Rhizoctonia solani. Late-maturing varieties were affected rather severely by powdery mildew (Erysiphe polygoni) but the disease was less prevalent than in 1942. Heavy rains in May caused peas to crack open within the pods. (W.W.Ray).

RHEUM RHAPONTICUM, RHUBARB. Crown rot (Phytophthora cactorum) was reported as very destructive in Oklahoma County. (Chester).

SOLANUM TUBEROSUM, POTATO. As usual there were no reports of late blight (Phytophthora infestans) in either spring or fall crops. Cracking and enlarged lenticels, due to the May rains following drought, were common grading factors. Dry root rot (Macrophomina phaseoli) was very destructive to tubers with losses reaching 75% in Payne County. Rhizoctonia (R. solani = Pellicularia filamentosa (Corticium vagum)) was unusually prevalent. (Chester).

SPINACIA OLERACEA, SPINACH. The upper leaves were infected with leaf spot (Alternaria sp.). Infection was moderate but the economic loss was not more than 1%. Downy mildew (Peronospora effusa) was very limited in extent in the 1943 season. The lower leaves of a single planting were affected, with slight defoliation and negligible loss.

#### DISEASES OF CEREALS, GRASSES, AND FORAGE CROPS

GRASSES. Ergot (Claviceps purpurea), which was epiphytotic in 1942 on large blue stem (Andropogon furcatus), sand blue stem (Andropogon hallii), Indian grass (Sorghastrum nutans), wild rye (Elymus canadensis and E. virginicus), and western wheat grass (Agropyron smithii), was virtually absent from these or other grasses in 1943, nor were the grass rusts observed in any important amount. (Chester).

MEDICAGO SATIVA, ALFALFA. Leaf spot (Pseudopeziza medicaginis) was difficult to locate. Losses varied from a trace to not more than 1%, as is usual in Oklahoma. Alfalfa rust (Uromyces striatus var. medicaginis) was apparent in older plantings in the alfalfa-growing regions of the State. Infection was observed in 4 localities where the loss was estimated as from a trace to 2% in older plantings.

SOJA MAX, SOYBEAN. Soybean plants revealing typical frog-eye leaf spot (Cercospora sojina) were very difficult to find. Observations and collections of diseased specimens were limited to 2 or 3 plantings. The amount of loss in each instance was negligible.

Pod and stem blight (Diaporthe phaseoli var. sojae) was apparent in 3 plantings in Oklahoma during the past season. A loss of nearly 2% could be attributed to this disease in 2 of the plantings. Plants in many



other areas revealed symptoms characteristic of this disease; however, fruiting bodies were not apparent.

Anthrachnose (Glomerella glycines) was observed causing considerable damage to nursery plantings in the State; however, this particular disease was not apparent in commercial plantings.

Loss due to wilt (Fusarium oxysporum f. tracheiphilum) (F. bulbigenum var. tracheiphilum) was negligible, although it was not too difficult to locate wilted plants in 2 diseased plantings.

Nematospora coryli, the causal organism of yeast spot in lima beans, caused a great deal of damage to soybeans in Oklahoma. Isolations of the fungus from soybeans collected at Stillwater have been made without any difficulty. An estimation of the loss due to yeast spot cannot be made at present; however, judging from prevalence in this region it could well become one of the major diseases of soybeans.

Dry rootrot (charcoal rot) (Macrophomina phaseoli=Sclerotium bataticola). Lodging due to the sclerotial stage was apparent in early plantings. In no instance, however, was the loss greater than 1%.

Bacterial blight (Pseudomonas glycinea) was widespread in its distribution during this season. In several plantings moderate defoliation resulted from attacks of blight in combination with the pustule disease. In degree of prevalence blight was less than pustule disease in Oklahoma.

Considerable damage was done by bacterial pustule (Xanthomonas phaseoli var. sojense). In 2 plantings severe defoliation resulted. This was the most prevalent and widespread disease during the past season in Oklahoma.

Soybean plants affected with mosaic (virus) were observed in most plantings. In commercial plantings the loss was negligible; however, in nursery plantings several varieties revealed large numbers of affected plants.

SORGHUM VULGARE, SORGHUM. Anthracnose (Colletotrichum graminicolum), in moderate infestations, was found in 6 out of 12 broomcorn plantings located in 2 counties.

Fusarium stem infection (Fusarium spp.) was very widespread. Infestations were moderate to severe; economic importance was negligible to slight. The late cool spring rendered seedlings susceptible to blights.

During the current year leaf spot (Helminthosporium sp.) was very sparse and limited in distribution, causing very little loss in leaf surface due to necrotic lesions.

Milo disease (Fythium arrhenomanes) was observed in plantings in various sections of the State. In plantings of susceptible varieties loss up to 5% could be attributed to it. Most varieties planted were more or less resistant, hence the loss was negligible.

Dry root rot (Charcoal rot) (Macrophomina phaseoli=Sclerotium bataticola). The sclerotial stage was widespread in Oklahoma during 1943. In commercial plantings losses associated with this organism of 2 or 3% were not at all uncommon. In nursery plantings at Perkins and Woodward one variety was nearly 80% affected.

Loose kernel smut (Sphacelotheca cruenta) was limited in its distribution this season, only a few infected heads being observed.

In fields in which the seeds had been treated chemically before planting very few examples of covered kernel smut (Sphacelotheca sorghi) were found. A loss of nearly 5% was observed in several plantings from untreated seed.

Kernel smut (hybrid?). Specimens of a kernel smut differing from loose or covered smut, tentatively identified as a hybrid, were found in 3 plantings in Oklahoma in 1943. The loss in infected plantings was negligible.

Bacterial stripe (Pseudomonas andropogoni) occurred sparsely during the past season, with negligible loss in most plantings.

Bacterial leaf spot (Pseudomonas syringae) was scattered in its distribution, causing very little loss except in one 40-acre planting in southwestern Oklahoma. An estimated loss of over 20% of the photosynthetic surface in this particular field was noted.

Bacterial streak (Xanthomonas holcicola) was the most widespread of all the bacterial diseases of sorghum in Oklahoma during 1943. Specimens could be found in most of the plantings surveyed; nevertheless, more than 10% of the foliage was affected only rarely.

TRITICUM AESTIVUM, WHEAT. Damage from rusts was comparatively slight. Leaf rust (Puccinia rubigo-vera var. tritici) (P. tritici), though prevalent by harvest time in June, developed too late in the season to be of importance. Stem rust (Puccinia graminis var. tritici) occurred in very insignificant amount. No reports were received of unusual amounts of wheat smuts (Tilletia spp., Ustilago tritici). Foot and root-rot (Helminthosporium sativum) was destructive in a number of localities, evidently more so than in normal years, its destructiveness being associated with devitalization of the plants from drought followed by excessive rain in May. (Chester).

VIGNA SINENSIS, COWPEA. In most plantings slight to moderate infestations of leaf spot (Cercospora cruenta) were observed. Defoliation was apparent late in the season, but too late to cause much loss.

Powdery mildew (Erysiphe polygoni) was observed in one irrigated planting this season where it was causing a loss of approximately 1%.

Wilt (Fusarium oxysporum f. tracheiphilum) (F. bulbigenum var. tracheiphilum) was observed in plantings where susceptible varieties had been seeded. Losses in these plantings were estimated at 5%.

Very little loss resulted from rust (Uromyces phaseoli var. vignae) infection of cowpeas in Oklahoma this season. Examples of infected plants were observed in the northwestern part of the State. Not over 1.5% of the foliage was affected.

Dry root rot (charcoal rot) (Macrophomina phaseoli). The pycnidial stage was extremely prevalent this season, and considerable loss resulted from infection by this fungus. It was not at all uncommon to find fields in which the loss was estimated as nearly 20%.

Bacterial canker (Pseudomonas syringae)<sup>1</sup>. Considerable damage resulted from bacterial canker infestations. Severe losses were observed in 2 or 3 plantings. In general, losses fluctuated from a trace up to 20% depending on the variety. From all indications this particular disease is one of the more serious maladies of cowpeas.

<sup>1</sup> (Burkholder describes the organism causing a similar disease of cowpeas in Texas as Xanthomonas vignicola n. sp. (Phytopath. 34: 430-432. Apr. 1944). See also Hoffmaster (Phytopath. 34: 439-441. Apr. 1944).

ZEA MAYS, FIELD CORN. Ear rots (Diplodia zeae and Fusarium sp., probably moniliforme). Loss from ear rots ranged from a trace to 1 or 2%. Diplodia and Fusarium were found in plantings scattered throughout the State.

Stalk rot (Diplodia frumenti). Collections have been made of this disease in Oklahoma. How serious the infestation is remains to be determined by future work. Two collections have been made in which D. frumenti has been isolated and determined to be the causal organism. Many other similar specimens have been collected but culture work has not been completed.

Smut (Ustilago maydis) (U. zeae) was widespread in plantings this season. Losses ranged from 1 to 15%. A conservative estimate of the infection in a planting at Seiling was 15%.

Dry root rot (charcoal rot) (Macrophomina phaseoli=Sclerotium bataticola). Lodging was present in some degree in all plantings observed. Losses fluctuated from a trace in late plantings to 10% or more in early plantings. Lodging was very apparent in the region from Chickasha to Lawton on early maturing corn.

Insect damage. Injury resulting from insect infestations caused considerable damage throughout the State. Attacks of earworm, lesser cornstalk borer, and southwestern corn borer were apparent in nearly every region in the State.

#### DISEASES OF FRUIT AND NUT CROPS

AMYGDALUS PERSICA, PEACH. As a result of the late freeze in Oklahoma very few peach fruits were set. Therefore, a comprehensive estimate of loss due to scab (Cladosporium carpophilum) could not be made. In 1 or 2 orchards where a small crop of fruit was set, fruits revealing scab infections were fairly common, suggesting possible loss from the disease if a normal crop had been produced. Leaf infections were very prevalent and widespread.

Only a few fruits were available for observation on brown rot (Monilinia (Sclerotinia) fruticicola) incidence this season. Nevertheless, mummies clinging to the trees and on the ground were suggestive that brown rot had been prevalent earlier. Very few examples of brown rot were observed on marketable fruit of late-maturing varieties.

A single record of leaf curl (Taphrina deformans) constitutes the known distribution of this disease in Oklahoma in 1943. The loss in this particular orchard was negligible since only a single tree was infected.

Bacterial spot (Xanthomonas pruni) was found to be the most serious disease of peach in this region. Severe defoliation occurred in most orchards examined. Trees free from bacterial spot were extremely difficult to find. Fruit infections were found in all orchards where fruits were set.

CARYA ILLINOENSIS, PECAN. Brown leaf spot (Cercospora fusca) was found causing slight damage to the varieties Stuart and Moneymaker in one planting. Infection was slight and very little, if any, defoliation occurred.

Downy spot (Mycosphaerella caryigena) was observed causing severe defoliation in one planting. Many varieties were affected by this disease which is becoming more apparent in Oklahoma.

Scab (Cladosporium effusum) was found to be the most widespread and

prevalent disease of pecans in Oklahoma during 1943. In orchards where spraying was not practised severe defoliation due to scab was apparent. Scab was severe on Burkett and Squirrel's Delight varieties in 2 of the plantings surveyed and severe defoliation resulted on both varieties.

Characteristic lesions of the vein spot disease (Gnomonia nerviseda) were apparent on the varieties Burkett and Stuart. The spots, which originate on the very small veins, were circular and about 1/16 inch in diameter. Infection was light and no defoliation resulted.

FRAGARIA, STRAWBERRY. Very little loss due to leaf blight (Dendrophoma obscurans) was apparent during 1943. Leaf spot (Mycosphaerella fragariae) was more prevalent than leaf blight; however, loss was negligible this year.

MALUS SYLVESTRIS, APPLE. Sooty blotch (Gloeodes pomigena) was present in several of the plantings observed but damage was negligible.

Isolated cases of apple-rust (Gymnosporangium juniperi-virginianae) were observed. Leaf infections were light to moderate in affected orchards. A single case was observed in which the fruit was infected.

Fly speck (Leptothyrium pomi) occurred in amounts comparable to, and usually associated with, sooty blotch. In no instance was infection assuming commercial importance; the disease was merely a minor factor in grading.

Fruit rot (Penicillium sp.) was found accompanying insect damage.

Blotch (Phyllosticta solitaria) was severe on early-maturing susceptible varieties. In one orchard of Yellow Transparent nearly 100% infection was estimated. Dry hot weather reduced the amount on late-maturing varieties; however, on several varieties the disease was observed causing a loss of about 5%.

Black rot (Phycolopora obtusa) was the most serious disease in eastern Oklahoma apple orchards. Losses of 1 to 10% were apparent in various orchards surveyed. Leaf, fruit, and twig infections were observed in nearly every orchard.

Brown rot (Monilinia (Sclerotinia) fructicola) was in most instances associated with injury to the fruit, either mechanical or from insects. Loss was negligible.

Scab (Venturia inaequalis), as a rule, is of minor importance in Oklahoma. This year, however, infection approached in amount outbreaks more normal to regions having more rainfall than does Oklahoma. Losses as high as 30% were observed in orchards normally having less than 1% damage. In neglected orchards losses were more extreme. In some instances most of the apples were used primarily for cider.

Considerable damage was done by fireblight (Erwinia amylovora) in certain localities. In the State as a whole the attack could be considered as light. Some neglected orchards have suffered severe mortality from fireblight attacks over the past few years.

PRUNUS spp., CHERRY. Leaf spot (Coccomyces hiemalis), in the most severely affected orchard observed in the State, caused defoliation estimated at 20%. Most of the trees observed in other orchards had 5% or less defoliation. A loss of 2% due to brown rot (Monilinia (Sclerotinia) fructicola) was observed in orchards.

PYRUS COMMUNIS, PEAR. Leaf blight (Fabraea maculata) was observed in only one orchard where slight defoliation resulted. Black rot (Phycolopora obtusa) of the fruit was observed in 2 plantings, causing a loss of 10 to 15%. Scab (Venturia pyrina) was observed on a single tree.

Twig infection was not observed.

The greatest loss due to fireblight (Erwinia amylovora) observed this year was 15%. Many trees were infected but in most cases the loss was not more than 2%.

RUBUS spp., CANE FRUITS. Blackberry anthracnose (Elsinoë veneta) was observed in an old planting causing a loss of nearly 20%. Other plantings showed less severe attacks; however, a total loss of 5% could be estimated. Orange rust (Gymnoconia peckiana) was observed in a single planting during the past year. Cane blight (Leptosphaeria coniothyrium) was observed in one raspberry planting on only 4 canes.

VITIS spp., GRAPE. Black rot (Guignardia bidwellii) was very prevalent in most of the plantings observed. In one planting a loss of nearly 60% could be attributed to black rot. Downy mildew (Plasmopara viticola) infection of the leaves appeared early in the season; however, owing to adverse weather conditions, very little loss resulted from these early infections.

#### DISEASES OF SPECIAL CROPS

ARACHIS HYPOGAEA, PEANUT. Leaf spot (Cercospora personata) was observed throughout the peanut-growing regions, but, with the exception of one or two plantings located in the "bottom lands", it caused very little damage. Defoliation was apparent near the end of the growing season in some localities. A loss of 1 or 2% of the leaf surface was not at all uncommon.

Stem and root rots (Rhizoctonia sp. and Fusarium sp.) Early in the season considerable loss due to Rhizoctonia was observed. In some plantings a loss of nearly 5% could be attributed to it. Later in the season Rhizoctonia was observed causing the death of more mature plants; however, the loss was never greater than 2%.

Fusarium-infected plants were observed in 2 or 3 plantings. In 2 collections, late in the season, Fusarium was isolated from necrotic lesions on the roots and stems.

Diplodia stem infection (Diplodia frumenti) Several collections of Diplodia frumenti-infected peanuts were made during the past season. How serious this fungus is on peanuts in Oklahoma is difficult to say on the basis of the few examples collected.

GOSSYPIUM, COTTON. Leaf spots (Alternaria sp. and Cercospora sp.) were very prevalent and widespread during the past growing season. Considerable defoliation occurred rather early in the season suggesting that losses may have been much greater than in past years. Cercospora leaf spot, considering the State as a whole, was more prevalent than Alternaria spot.

Fusarium wilt (F. oxysporum f. vasinfectum) was found less frequently than in past years. This may be explained in one of two ways: (1) resistant varieties are being planted in regions where wilt was severe in the past; (2) weather conditions were so adverse that soil temperatures may have prevented severe infections by Fusarium.

Root rot (Phymatotrichum omnivorum) probably accounted for the actual death of a higher percentage of plants than any other single disease. Losses in several plantings exceeded 15%. In one planting the infection was nearly 40%. Root rot was found in a new location (Davis) in the State this year. The amount of damage in this new area was less than 1%.

Verticillium wilt (V. albo-atrum) was observed in 2 plantings this year. The amount of loss was less than that caused by Fusarium wilt.

Angular leaf spot (Xanthomonas malvacearum) was not so widespread as in past seasons. Early in the season several plantings were observed with primary infections. Late in the season it was rather difficult to locate the disease; however, in regions where the so-called "local rains" fell, a considerable amount of angular leaf spot was found.

Boll rots were negligible. Four or five plantings revealed minor losses due to boll rots in which the angular leaf spot bacterium caused the primary infection.

Soil deficiencies (manganese and potassium). Cotton plants were observed in various regions showing signs of manganese and potassium hunger. Whether the soils were deficient or the minerals non-available owing to dry weather was not determined.

### PLANT DISEASES OBSERVED IN TEXAS DURING 1943

G. M. Watkins

The following summary of plant diseases in Texas during 1943 was compiled from observations made by eleven persons, including the writer. Each item was contributed by one of the following observers, indicated by initials: Mr. I. M. Atkins, Dr. A. A. Dunlap, Dr. W. N. Ezekiel, Dr. G. H. Godfrey, Dr. S. S. Ivanoff, Dr. H. W. Larsh, Dr. E. W. Lyle, Dr. E. C. Tullis, Dr. R. D. Watson, Dr. P. A. Young, and the writer.

#### VEGETABLE CROPS

ALLIUM CEPA, ONION. Alternaria (Macrosporium) porri, purple blotch and leaf blight, was serious in March in Nueces County in the Coastal Bend region (GHG).

Fusarium spp., bulb rot, was generally scattered in Dimmit County in the Winter Garden region. A trace occurred in most fields, but it was severe in one (SSI).

Peronospora destructor, downy mildew, was seen for the first time in Texas in 1943, in Dimmit County where it caused 5% loss (SSI).

Phoma terrestris, pink root, occurred throughout the Winter Garden district, causing losses of 5 to 15% (SSI).

Sclerotium sp., white mold, was general throughout the Winter Garden region (SSI).

Leaf blight or tip blight (nonparasitic) was general throughout the Winter Garden district where loss was 10% (SSI). It was observed in Calhoun and Nueces Counties on the Gulf Coast (AAD).

BETA VULGARIS, BEET. Cercospora beticola, leaf spot, was observed causing losses in yield averaging 2% in several fields each in Hidalgo, Webb, Maverick, and Bexar Counties (GMW). The disease was general throughout the Winter Garden district, the loss amounting to 5% (SSI). Light to moderate infection was observed in Hidalgo County (HWL).

Southern blight (Sclerotium rolfsii) and the virus diseases curly top and mosaic were scattered throughout the Winter Garden district, occurring in trace amounts (SSI).



BRASSICA spp. Peronospora parasitica, downy mildew, and Xanthomonas campestris, black rot, occurred throughout the Winter Garden district. The former was generally distributed and caused loss averaging 2%; scattered infections of the latter resulted in 5% loss (SSI).

BRASSICA OLIFACEA var. ACEPHALA, COLLARDS. Infection of 100% with the rootknot nematode, Heterodera marioni, was observed in one home garden in Nacogdoches County in east Texas (GMW).

BRASSICA OLIFACEA var. BOTRYTIS. Alternaria circinans (A. brassicae), leaf spot, was observed in Bexar County (AAD). Peronospora parasitica, downy mildew, caused negligible damage in Dimmit County (HWL).

BRASSICA OLIFACEA var. CAPITATA, CABBAGE. Leaf spot (Alternaria circinans) (A. brassicae) and black rot (Xanthomonas campestris) caused negligible losses in Bexar and Maverick Counties. Downy mildew (Peronospora parasitica) was observed in several plantings in Hidalgo County, causing slight to moderate damage. Watery soft rot (Sclerotinia sclerotiorum) caused 5% loss in 2 plantings examined in Bexar County (HWL).

A few plants affected by mosaic (virus) were seen in Hidalgo County (GMW).

CAPSICUM FRUTESCENS, PEPPER. Alternaria solani, early blight, occurred in traces throughout the Winter Garden region (SSI).

Cercospora capsici, leaf spot, was widespread but causing little damage in the Winter Garden region (HWL). It was of slight importance in 2 fields observed in Cherokee County in east Texas. A trace was noted on 120 acres in Zavala County in the Winter Garden district (GMW).

Fusarium annuum, wilt, caused considerable damage in Maverick County in the Winter Garden region (HWL).

Gloeosporium piperatum, anthracnose, occurred in traces scattered throughout the Winter Garden district (SSI).

Sclerotium rolfsii, southern blight, was generally distributed throughout the Winter Garden district where it caused 5% loss (SSI).

Verticillium albo-atrum, wilt, was prevalent and widespread in the Winter Garden district, causing losses ranging from a trace to 15% (HWL).

Xanthomonas vesicatoria, bacterial spot, was observed causing negligible loss in 2 plantings in Maverick County (HWL).

Heterodera marioni, rootknot, caused complete loss in 2 acres observed in Fort Bend County (GMW).

Cuscuta arvensis, dodder, was causing slight damage in 1 field in Cherokee County (PAY & GMW).

Curly top (virus) was scattered throughout the Winter Garden district, where it caused 1% loss (SSI). It was observed causing 0.5% loss in one field in Webb County (HWL).

Mosaic (virus) caused loss averaging 1% in numerous fields observed in Hidalgo County and in several fields in Maverick and Webb Counties. It was severe in a 2-acre field in Fort Bend County. A 1/10-acre field in Cherokee County suffered about 50% loss (GMW). Mosaic was general throughout the Winter Garden district where the loss averaged 40% (SSI). In the Winter Garden and Lower Rio Grande Valley districts losses in fields examined ranged from 1 to 100% (HWL).

Sun scald (nonparasitic) damaged from 3 to 5% of the fruits in several fields noted in El Paso County (GMW).

CICHORIUM ENDIVIA, ENDIVE. A trace of aster yellows (virus) was observed in a 1-acre field in Dimmit County (GMW).

**CITRULLUS VULGARIS, WATERMELON.** Leaf blight (Alternaria cucumerina) was severe in Cherokee County (PAY). Anthracnose (Colletotrichum lagenarium) and downy mildew (Pseudoperonospora cubensis) were generally distributed throughout the Winter Garden district where the loss from each disease was estimated at 5% (SSI). Wilt (Fusarium oxysporum f. niveum) (F. bulbigenum var. niveum) killed 3% of the plants in one 20-acre field examined in Erath County (GMW).

**CITRULLUS VULGARIS** var. **CITROIDES, CITRON.** Charcoal rot (Sclerotium bataticola) was noted in Cherokee County (PAY).

**CUCUMIS MELO, CANTALOUPE.** Erysiphe cichoracearum, powdery mildew, was general throughout the Winter Garden district and caused 1% loss (SSI). A trace was observed in Hidalgo County in the fall (GHG).

Pseudoperonospora cubensis, downy mildew, was observed in small amounts on experimental plantings in Hidalgo and Dimmit Counties in the fall (GMW). The disease was general throughout the Winter Garden district and caused loss amounting to 25% (SSI). In Hidalgo County downy mildew was scarce in the spring but occurred abundantly in the fall (GHG). A loss of 10% was caused in Bell County (HWL).

Sclerotium rolfsii, southern blight, occurred abundantly on cantaloupe in Hidalgo County in the spring (GHG). A trace was observed in Walker County in east Texas in the spring (GMW).

Pterodera marioni, rootknot, was abundant in Hidalgo County (GHG).

Small amounts of mosaic (virus) were observed in Hidalgo and Dimmit Counties (GMW). Mosaic was general throughout the Winter Garden district where it caused 10% loss (SSI).

**CUCUMIS SATIVUS, CUCUMBER.** Downy mildew (Pseudoperonospora cubensis) and mosaic (virus) were general throughout the Winter Garden district. Estimated losses were 40% from downy mildew and 15% from mosaic (SSI).

Chlorosis (physiogenic) was observed in Dallas County (AAD).

**CUCURBITA MAXIMA, SQUASH.** Erysiphe cichoracearum, powdery mildew, killed 100% of the plants in one field observed in Dimmit County (GMW). Powdery mildew was widespread in the Winter Garden district, causing losses averaging up to 2% (HWL).

In one 20-acre field in Hidalgo County in the Lower Rio Grande Valley, Pseudoperonospora cubensis, downy mildew, was causing 50% loss (GMW), and nearly 100% loss in one small planting in this county (HWL), but in most fields it affected only the lower leaves (GHG). The disease was causing from 1 to 15% loss in fields examined in Dimmit County in the Winter Garden district (HWL).

Mosaic (virus) affected 5% of the plants in one 20-acre field observed in Hidalgo County (GMW). Slight loss resulted from mosaic in plantings examined in Hidalgo and Dimmit Counties (HWL).

**CUCURBITA MOSCHATA.** Mosaic (virus) occurred in scattered infections throughout the Winter Garden district, causing loss ranging from 10 to 25% (SSI).

**DAUCUS CAROTA, CARROT.** Leaf blight (Alternaria carotae) and southern blight (Sclerotium rolfsii) were generally distributed throughout the Winter Garden district, losses from each disease averaging 2% (SSI).

Aster yellows (virus) caused from 25 to 80% loss, averaging 40%, on mature plants in numerous fields examined in Zavala and Dimmit Counties in the Winter Garden region (GMW). The disease was general throughout the Winter Garden district, loss in affected fields varying from a trace to 15%, averaging 4% (SSI), extent of infection observed ranging from



none to 69% (HWL). In the Lower Rio Grande Valley one field was observed in Hidalgo County with 7% infected plants, and slight loss was noted in a field in Cameron County (HWL).

IPOMOEA BATATAS, SWEETPOTATO. Actinomyces ipomoeae, soil rot, was present on from 3 to 5% of all roots seen in Smith, Upshur, Camp, Titus, and Brazos Counties in east Texas, and occasional lots with 20% or more were encountered in all of these counties (GMW).

Endoconiliophora (Ceratostomella) fimbriata, black rot, occurred in trace amounts in one shed inspected in Smith County and in one in Upshur County (GMW). The disease was observed in Upshur County (AAD).

Fusarium sp., surface rot, was noted in Brazos and Hardin Counties (AAD).

Rhizopus sp., rot, occurred to a greater or less extent in all lots of stored roots examined in Smith, Upshur, Camp, and Titus Counties (GMW).

Sclerotium bataticola, charcoal rot, was observed in Smith County (AAD).

Heterodera marioni, rootknot, was noted on sweetpotato in Brazos County (AAD).

LACTUCA SATIVA, LETTUCE. Sclerotinia sclerotiorum, drop, was observed to be causing 3% loss in 1 planting in Bexar County (HWL).

A trace of aster yellows (virus) was observed in a 1-acre field in Dimmit County (GMW). The disease was general in Maverick County, where loss in fields examined averaged 1% (SSI). From 5 to 30% loss was noted in fields in Bexar and Dimmit Counties (HWL).

LYCOPERSICON ESCULENTUM, TOMATO. Alternaria solani, early blight, was generally distributed but usually not serious (GMW). Infection was general throughout the Winter Garden district and loss averaged 1% (SSI). In Cherokee County 100% defoliation was observed in a 2-acre field (PAY). The disease occurred generally in fields observed in the Winter Garden district and the Lower Rio Grande Valley, but damage was usually slight (HWL).

Alternaria (Macrosporium) tomato, nailhead spot, occurred in traces in fields scattered throughout the Winter Garden district (SSI).

Corynebacterium michiganense, bacterial canker, was observed in Gillespie County (WNE).

Fusarium oxysporum f. lycopersici (F. bulbigenum var. lycopersici), wilt, caused 100% loss in one 3-acre field examined in Atascosa County (GMW). Loss of 3% was general throughout the Winter Garden district (SSI). Up to 5% damage was observed in fields examined in Dimmit, Maverick, and Atascosa Counties, and up to 2% in several plantings in Hidalgo County (HWL).

Phoma destructiva, Phoma rot, was general throughout the Winter Garden district, causing loss amounting to 2% (SSI).

Phytophthora parasitica (P. terrestris), buckeye rot, occurred generally throughout the Winter Garden district, loss averaging 1% (SSI). Buckeye rot was observed in Brazos County (WNE).

Pseudomonas solanacearum, bacterial wilt, was observed in Cherokee County (PAY).

Pseudomonas (Bacterium) tomato, bacterial speck, caused loss of 2% in Cherokee County (PAY).

Rhizoctonia solani, soil rot, caused 1% loss of fruit in Cherokee County (PAY).

Sclerotium rolfsii, southern blight, was generally distributed, but only occasionally serious in the fall of 1943 (GMW). It occurred generally throughout the Winter Garden district, causing loss of 5% (SSI).

A trace was observed in Bell County (EWL). In Cherokee County 80% loss was noted in one planting (PAY), and in Atascosa County 2% loss in one planting (EWL).

Stemphylium solani, gray leaf spot. A trace was observed in Dimmit County (SSI).

Heterodera marioni, affected all of the plants in a 3-acre field in Atascosa County (GMW). The disease occurred generally throughout the Winter Garden district, causing loss of 2%. It was especially prevalent near Quemado in Maverick County (SSI). Rootknot was noted on tomatoes in Kerr, Bexar, and Dallas Counties (AAD).

Curly top (virus) affected 1% of the plants in all fields examined in Dimmit, Webb, Maverick, and Hidalgo Counties (GMW). The disease was general and caused a loss of 1% throughout the Winter Garden district (SSI).

Mosaic (virus) caused 2% loss generally throughout the Winter Garden district (SSI). In Fort Bend County 50% loss was observed in one small planting (GMW). Traces of aucuba mosaic occurred in scattered fields throughout the Winter Garden district (SSI). Cucumber mosaic was general in the Winter Garden district, causing 1% loss (SSI).

Traces of the virus diseases spotted wilt and streak occurred throughout the Winter Garden district (SSI).

A trace of blossom-end rot (physiogenic) occurred generally throughout the Winter Garden district (SSI). Blossom-end rot was common in home plantings, averaging 3% loss, in Walker County (GMW).

Chlorosis (physiogenic) affected all plants in 10 acres observed in Zavala County (GMW). Chlorosis was noted in Johnson County (AAD).

Fruit pox (probably physiogenic) affected 50% of the fruits in one home planting examined in El Paso County (GMW). The disease was general throughout the Winter Garden district, causing 2% loss (SSI).

Shoulder blotch (nonparasitic) occurred in traces throughout the Winter Garden district (SSI).

Rosette (cause undetermined) was noted in Bowie County (AAD).

PHASEOLUS LUNATUS, LIMA BEAN. Rootknot (Heterodera marioni) was observed in Cass County (AAD).

PHASEOLUS VULGARIS, BEAN. Erysiphe polygoni, powdery mildew, was severe on susceptible varieties in variety trials in Dimmit County (GMW). The disease was generally distributed in the Winter Garden district where it caused 2% loss (SSI).

Fusarium spp., root rot. A trace occurred in scattered fields throughout the Winter Garden district (SSI).

Macrophomina phaseoli, ashy stem blight, occurred in numerous fields in Cameron and Hidalgo Counties, loss averaging 0.1% (GMW). The disease occurred in scattered fields in Dimmit County where the loss was 1% (SSI). In Hidalgo County the disease was observed on the Experiment Station and on various farms on the spring crop (GHG); 2% loss was noted in 2 fields in this county (EWL).

Phymatotrichum omnivorum, root rot, caused a loss of 1% in Bell County (EWL).

Pythium sp., stem blight. From a trace to 30% was observed in fields in Hidalgo County (GHG).

Rhizoctonia solani, stem and root rot, was observed causing 0.1% loss in numerous fields in Cameron and Hidalgo Counties. On 15 acres in Hidalgo County loss was 29% (GMW). From a trace to 2% loss resulted in Hidalgo County (GHG). The disease was noted in Victoria and Dallas Counties (AAD).

Sclerotium rolfsii, southern blight, caused 0.1% loss in numerous fields in Cameron and Hidalgo Counties (GMW). Southern blight was general throughout the Winter Garden district, loss averaging 3% (SSI). Losses ranging from a trace to 15% occurred in the fall crop in Hidalgo County (GHG). The disease was observed in Harris, Nolan, and Scurry Counties (AAD).

Uromyces phaseoli var. typica, rust, caused 25% loss in a planting of less than an acre in Smith County. It was severe on susceptible varieties on variety trials in Dimmit County (GMW). In one planting in Hidalgo County all leaflets were infected (EWL).

Xanthomonas phaseoli, bacterial blight, was observed in McLennan and San Patricio Counties (AAD).

Curly top (virus) occurred in scattered traces throughout the Winter Garden district (SSI).

Common mosaic (virus). Infection of 95% was observed in 40 acres in Dallam County; 1% infection was noted in 3 fields in Red River County; a trace occurred on 15 acres in Hidalgo County (GMW). The disease was general and caused 2% loss in the Winter Garden district (SSI).

Yellow mosaic (virus) caused a trace of loss in scattered fields throughout the Winter Garden district (SSI).

Chlorosis (nonparasitic) was universal in the Lower Rio Grande Valley following irrigation on alkaline soils (GMW).

PISUM SATIVUM, PEA. Erysiphe polygoni, powdery mildew, caused a 2% loss in Bell County (EWL).

SOLANUM MELONGENA, EGGPLANT. Phomopsis vexans, blight and fruit rot, caused significant losses in Atascosa and Maverick Counties (HWL). Phymatotrichum omnivorum, root rot, was observed in Brazos County (AAD). Sclerotium rolfsii, southern blight, was general in the Winter Garden district and caused a 3% loss (SSI).

Heterodera marioni, rootknot, caused 100% loss in one quarter-acre planting observed in El Paso County (GMW). Loss of 5% was noted in one field in Webb County. The disease was prevalent in the Winter Garden district (HWL).

Yellows (virus) was observed affecting 50% of the plants in a half-acre planting in Cherokee County, 100% of the plants in 2 home gardens in Houston County, 85% in 2 acres in Fort Bend County, from 11 to 70% in 3 fields in Atascosa County, and a trace in 1 field in Maverick County (GMW). The disease occurred generally throughout the Winter Garden district, loss amounting to 15% (SSI). An average of 10% infection was noted in fields examined in the Winter Garden district and the Lower Rio Grande Valley (HWL).

SOLANUM TUBEROSUM, POTATO. Actinomyces scabies, scab, was present in all production districts in the Panhandle, infected tubers ranging from 2 to 50% (GMW). It was severe in some fields in Cameron and Hidalgo Counties in the Lower Rio Grande Valley (GHG). It was observed in Hale and Floyd Counties (AAD).

Alternaria solani, early blight, was general but causing slight damage in several large fields examined in Lubbock, Bailey, Deaf Smith, and Dallam Counties in northwestern Texas and the Panhandle (GMW). In Cameron County it did not appear until the crop was practically made (GHG).

Bacillus sp., soft rot, was observed in Harris County (AAD).

Phytophthora infestans, late blight. A trace of infection was noted in Cameron County but development was stopped by dry weather (GHG).

A trace of Rhizoctonia solani was seen on tubers in graders in various parts of the Panhandle, and in several fields in Dallam County (GMW).

Sclerotium bataticola, charcoal rot, caused 3 to 4% loss in several fields examined in Lubbock County (GMW). In east Texas the disease caused 20% loss (RDW).

Sclerotium rolfsii, southern blight, was present in all production districts of the Panhandle, but infection was never more than a trace (GMW). Damage of 1% was noted in 1 field in Cherokee County (PAY).

Certain home gardens in Walker County in east Texas showed 100% infection by Heterodera marioni, rootknot (GMW).

Haywire (virus) was general in Smith County in east Texas, loss amounting to 2% (RDW).

Leaf roll (virus) was negligible in Hidalgo County on fields from northern certified seed. Use of locally grown seed one year from certified resulted in 48% infection (GHG).

Mosaic (virus) was general in Smith County where it caused 3% loss (RDW). A trace was noted in Dallam County (GMW).

Spindle tuber (virus) infected all tubers in 2 lots of White Rose examined, one in Lubbock County, the other in Floyd County (GMW).

SPINACIA OLTRACETA, SPINACH. Albugo occidentalis, white rust, was widespread in Maverick County in the Winter Garden district, loss averaging 35% (EWL). Throughout the Winter Garden district generally loss averaged 15 to 25% (SSI). In the Robstown area the disease caused total loss in one field observed in Nueces County (GHG), and traces were observed in one field in Nueces County and another in San Patricio County (GMW).

Throughout the Winter Garden district, traces of anthracnose (Colletotrichum spinaciae) and leaf spot (Heterosporium variabile) were found in scattered fields, while wilt (Fusarium spinaciae) occurred generally, but also in trace amounts (SSI).

Peronospora effusa, downy mildew. A trace was observed in one field in Zavala County (GMW). The disease was general throughout the Winter Garden district, loss caused amounting to 10% (SSI). Downy mildew was abundant in Nueces and Hidalgo Counties (GHG). From a trace to 100% infection occurred in fields examined in Bexar, Dimmit, Frio, Maverick, and Uvalde Counties (EWL).

Aster yellows (virus) caused 40% loss in 130 acres examined in Maverick County (EWL).

Curly top (virus) affected less than 1% of the plants in 2 fields observed in Zavala County (GMW). The disease was general in the Winter Garden district, loss caused amounting to 2% (SSI & EWL).

Occasional plants affected by mosaic (virus) were noted in Maverick County (EWL).

Chlorosis (physiogenic) caused moderate damage in one field observed in Bexar County (GMW).

#### CEREALS, GRASSES, AND FORAGE CROPS

AVENA SATIVA, OATS. Mild attack of crown rust (Puccinia coronata) caused 2% loss in north-central Texas, while a trace was observed in the Rolling Plains region. Stem rust (P. graminis) occurred in like amounts in both regions (IMA). Loose smut (Ustilago avenae) caused a loss of 2% in Bell County (EWL). It was observed in north-central Texas (IMA).

**CROTALARIA.** Phymatotrichum omnivorum, root rot, caused 30% loss of stand of C. juncea in Bell County (EWL). In a 1-acre planting of C. spectabilis in Cherokee County, Sclerotium bataticola, charcoal rot, caused 100% loss (PAY).

**HORDEUM VULGARE, BARLEY.** Powdery mildew (Erysiphe graminis) was severe and caused 5% loss in north-central Texas. A trace of leaf rust (Puccinia anomala) occurred in that region (IMA).

**MEDICAGO SATIVA, ALFALFA.** Phymatotrichum omnivorum, root rot, caused from a trace to 5% loss in numerous fields observed in Reeves County (GMW). A loss of 50% occurred in Bell County (EWL).

Traces of Pseudopeziza medicaginis, leaf spot, were observed in numerous fields in El Paso, Reeves, Ward, Crane, and Pecos Counties (GMW).

Yellow leaf blotch (Pyrenopeziza medicaginis) caused slight damage in Hidalgo County (HWL).

Uromyces striatus, rust, occurred in trace amounts in numerous fields examined in El Paso, Reeves, Ward, Crane, and Pecos Counties (GMW). It was prevalent in Hidalgo County (HWL).

Girdling, attributed by some to insect injury, was observed in 3 fields in Ward County, where 5% of the plants were damaged (GMW). Loss of 5% resulted in Hidalgo County (HWL).

**MELILOTUS, SWEETCLOVER.** Phymatotrichum omnivorum, root rot, caused 20% loss of M. alba and M. alba var. annua in Bell County (EWL).

**ORYZA SATIVA, RICE.** Cercospora oryzae, leaf spot, was fairly abundant in Jefferson and Orange Counties. A trace was noted west of Houston. Entyloma oryzae, leaf smut, was ubiquitous on older rice leaves in the southeastern coastal belt but damage was slight. Helminthosporium oryzae, leaf spot, was common throughout the southeastern coastal section. Often the fungus attacked 3 to 5% of the florets. Piricularia oryzae, blast, occurred throughout the southeastern coastal belt, but never more than a trace was seen. Straighthead (physiogenic) was serious and caused nearly complete loss of the crop in a few fields in Orange County (GMW).

**SESAMUM INDICUM, SESAME.** Bacterium sesamicola, foliage and stem blight, caused serious injury in experimental plantings in Denton, Bell, and Brazos Counties (GMW). In Bell County a 4% loss was caused (EWL).

**SOJA MAX, SOYBEAN.** Macrophomina phaseoli, ashy stem blight, was severe in the spring in plantings at the Experiment Station in Hidalgo County (GHG). Phymatotrichum omnivorum, root rot, occurred on soybean in trace amounts in Bell County (EWL). Pseudomonas glycinea, bacterial blight, caused slight injury in experimental plantings in El Paso County; while Xanthomonas phaseoli var. sojense, bacterial pustule, caused complete defoliation of most varieties in experimental plantings in Hardeman and Denton Counties (GMW).

**SORGHUM VULGARE, SORGHUM.** Leaf blight (Helminthosporium turcicum) was severe in one large field in Zavala County (GMW). Leaf stripe (Pseudomonas andropogoni) was common on susceptible varieties throughout the coastal plain (GMW). In one experimental planting in Hardeman County, root rot (Pythium arrhenomanes) caused moderate damage on susceptible varieties (GMW). Charcoal rot (Sclerotium bataticola) caused moderate damage to milos in Hardeman County (ECT). A trace of covered smut (Sphacelotheca sorghi) was noted in Bell County (EWL).

**STENOTAPHRUM SECUNDATUM.** Leaf spot (Piricularia sp.) and brown patch (Rhizoctonia sp.) were common in Hidalgo County (GHG).

**TRITICUM AESTIVUM, WHEAT.** A trace of powdery mildew (Erysiphe graminis) occurred in wheat fields in north-central Texas (IMA). Stem rust (Puccinia graminis) caused 10% loss in Bell County (EWL). A trace occurred in north-central Texas in the spring (IMA). Heavy fall infection by leaf rust (P. rubigo-vera var. tritici) was observed in north-central Texas and the rolling plains and panhandle regions, and severe development in the spring caused 5% loss in the north-central area (IMA). Speckled leaf blotch (Septoria tritici) was severe and caused 2% loss in north-central Texas, while a trace occurred in the rolling plains area (IMA). Traces of loose smut (Ustilago tritici) were observed in north-central Texas and the rolling plains (IMA).

**VIGNA SINENSIS, CONPEA.** Leaf spot (Cercospora cruenta) occurred generally in central, east, and southern Texas, causing losses up to 10% (GMW). Powdery mildew (Erysiphe polygoni) was observed in one field in Kendall County, where all plants were heavily attacked (G). Wilt (Fusarium spp.) caused 3 to 15% loss in 2 plantings observed in Atascosa County (EWL). Ashy stem blight (Macrophomina phaseoli) occurred in trace amounts in one field in Hidalgo County, and 2% loss was noted in a 2-acre planting in Cameron County (GMW). The disease was observed in Cherokee County (PAY). A loss of 2% resulted from root rot (Phymatotrichum omnivorum) in Bell County (EWL). Stem rot (Rhizoctonia solani) caused less than 1% loss in fields examined in Webb and Hidalgo Counties (HWL). Southern blight (Sclerotium rolfsii) caused loss of 2% in Atascosa County (HWL). Rust (Uromyces phaseoli var. vignae) was severe in several fields in Hidalgo County (GMW), and in a 2-acre planting in Cameron County and caused slight loss in fields observed in Atascosa County (HWL).

Crown canker (pathogen described as Xanthomonas vignicola n. sp. by Burkholder, Phytopath. 34: 430-432, Apr. 1944), was observed as follows: 95% of the plants affected in 4 fields in Kendall County; 60% affected in 1 field in Dimmit County; 10% in several fields in Hidalgo County; 25% in 1 field in Houston County; 25% in several fields in Cherokee and Smith Counties (GMW).

A trace of mosaic (virus) was noted in occasional fields in east Texas, and 90% loss in a 3- to 4-acre planting in Fort Bend County (GMW). The disease was observed in Harris and Dallas Counties (AAD).

**ZEA MAYS, CORN.** Traces of ear rot due to Diplodia zeae occurred in Bell County (EWL), and occurrence of the disease was noted in Comal, Burnet, and Falls Counties (AAD). Leaf blight (Helminthosporium turcicum) was scarce this year in Hidalgo County (GHG). Smut (Ustilago maydis) (U. zeae) affected 10% of the ears in 1 field in El Paso County and 50% of the ears in one in Camp County (GMW). A trace occurred in Bell County (EWL). In one fall planting in Cherokee County 75% of the ears were smutted, but the disease was rare in the spring (PAY). The meadow nematode (Pratylenchus pratensis) caused severe damage in Cherokee County (PAY).

#### FRUIT AND NUT CROPS

**AMYGDALUS PERSICA, PEACH.** Traces of brown rot (Monilinia fructicola) (Sclerotinia americana) occurred in Bell County (EWL). A trace of bacterial spot (Xanthomonas pruni) was observed in one orchard in Erath County (GMW). Rootknot (Heterodera marioni) was noted on peach in Kendall County (AAD). Chlorosis (physiogenic) caused 10% loss in Bell



County (EWL), and occurrence was noted in Bexar and Travis Counties (AAD).

CARYA ILLINOENSIS, PECAN. Cladosporium effusum, scab, caused slight damage in 1 home planting in Tyler County and to native trees in woods in Matagorda County (GMW). Rosette (nonparasitic) was observed in Menard County (AAD).

CITRUS spp. A trace of fruit rot caused by Alternaria citri was observed in 1 orchard in Dimmit County (GMW). Melanose (Diaporthe citri) occurred in traces in 1 orchard in Dimmit County (GMW); there was much less in Cameron County than for 2 years previously (GHG). Up to 50% of stem-end rot (Diplodia natalensis) occurred in shipments from the Lower Rio Grande Valley (GHG). Only light attacks of scab (Elsinoë fawcettii) were noted in the Valley this year (GHG). Blue mold (Penicillium sp.) occurred throughout the Winter Garden district where it caused from 5 to 10% loss, and chlorosis (nonparasitic) was general in this district, loss due to it being estimated at 2% (SSI).

FICUS CARICA, FIG. A trace of root rot (Phymatotrichum omnivorum) was observed in Bell County (EWL). Rust (Physovella fici) caused 5% loss in 1 orchard examined in Brazoria County and 10% in several orchards in Galveston and Harris Counties (GMW); it was observed in Jim Hogg County (AAD). Rootknot (Heterodera marioni) was noted on fig in Dallas County (AAD).

FRAGARIA, STRAWBERRY. A trace of leaf scorch (Diplocarpon earliana) was noted in 1 small planting in Smith County and another in Atascosa County (GMW). Leaf spot (Mycosphaerella fragariae) occurred in traces in 1 small planting in Cherokee County (GMW); it was scattered throughout the Winter Garden district where it caused 2% loss (SSI). In Dimmit County, summer dwarf (Aphelenchoides sp.), caused 100% loss in one small planting (GMW) and 50% loss in local areas (SSI). Rootknot (Heterodera marioni) occurred generally on strawberries throughout the Winter Garden area, where it caused 15% loss (SSI).

VALIS SYLVESTRIS, APPLE. Many galls due to Agrobacterium tumefaciens were observed on the upper limbs and top of a tree 5 feet tall in Cherokee County (PAY). Fireblight (Erwinia amylovora) caused 10% loss in a home orchard in El Paso County (GMW). Bitter rot (Glomerella cingulata) was observed in Morris and Smith Counties, and blackrot (Physalospora obtusa) in Menard County (AAD).

PRUNUS spp. Crown gall (Agrobacterium tumefaciens) was observed in Bexar County (AAD). Bacterial spot (Xanthomonas pruni) caused a trace of damage in one orchard in Atascosa County, and serious injury in one in Jasper County (GMW).

PYRUS COMMUNIS, PEAR. A trace of infection by leaf spot (Cercospora minima) occurred in 1 nursery in Shelby County (GMW). Fireblight (Erwinia amylovora) was common in home orchards throughout central and east Texas, but damage was usually moderate (GMW). Moderate damage was observed in 1 home orchard in El Paso County (GMW). In Bell County 2% loss was noted (EWL). Black rot (Physalospora obtusa) was observed in Jefferson County (AAD).

RUBUS spp., CANE FRUITS. Agrobacterium tumefaciens, crown gall, was general and caused 2% loss in east Texas (RDW). Gymnoconia peckiana (G. interstitialis), rust, was common in Cherokee County (PAY), and caused 3% loss in east Texas (RDW). Mycosphaerella rubi, leaf spot, occurred in east Texas (RDW).

VITIS spp., GRAPE. Guignardia bidwellii, black rot, was general

throughout the Winter Garden district where it caused 10% loss (SSI), and occurrence was noted in Harris County (WNE). Plasmopara viticola, downy mildew, was general and caused a trace of loss in Dimmit County (SSI); it occurred in Harris County (WNE). Sphaceloma ampelinum, anthracnose, caused a trace to 7% loss in Dimmit County (SSI). "California disease" (virus), caused 75% loss in local areas in Dimmit County (SSI).

### SPECIAL CROPS

ARACHIS HYPOGAEA, PEANUT. Leaf spot caused by Mycosphaerella arachidicola began showing up in east Texas in August, and considerable defoliation occurred in some fields in that area in September (GMW). The disease was mild in Cherokee County this year (PAY). Mycosphaerella berkeleyi was general in all peanut sections, showing up in September and causing serious defoliation in many fields in October and November (GMW).

Charcoal rot (Sclerotium bataticola) caused a trace of damage in one field in Waller County and another in Atascosa County (GMW).

Southern blight (S. rolfsii) was general in all peanut areas, causing from 1 to 2% loss in some fields (GMW). It was observed in Cherokee County (PAY), Atascosa, Bexar, Gonzales, and Bell Counties (AAD), Franklin County (GMW).

CARTHAMUS TINCTORIUS, SAFFLOWER. Blight due to Gloeosporium sp. caused a loss of 30% in Bell County (EWL).

GOSSYPIUM, COTTON. Only a trace of leaf spot (Cercospora althaeina) was observed in occasional fields in eastern and central Texas (GMW).

Fusarium wilt (F. oxysporum f. vasinfectum) was generally distributed in east Texas, loss ranging up to 10% in some cases. In Washington County 100% infection was observed on 1 acre; in Lee County 5% on 20 acres (GMW). Wilt was observed in Polk County (AAD).

Leaf spot caused by Macrosporium nigricantium was uniformly severe in numerous fields seen in El Paso and Hudspeth Counties, and was generally distributed but not severe in numerous fields examined in Reeves, Loving, Ward, Crane, and Pecos Counties (GMW).

Root rot (Phymatotrichum omnivorum) caused less than the usual amount of damage in the heavy black soils of north, central, and south Texas. Losses were heavy (up to 75% killing of plants) in Nueces, San Patricio, and Jim Wells Counties, while slight loss was observed in a few fields in Cherokee County and 1 field in Hidalgo County, and a trace in most fields in Hudspeth, Reeves, Ward, Crane, and Loving Counties (GMW). The disease occurred locally in Maverick County, resulting in 5% loss (SSI). Attack in the Lower Rio Grande Valley was light this year (GHG). Loss of 20% occurred in Bell County (EWL).

Rust (Puccinia stalmanii) (P. schedonnardi) was seen in one field in El Paso County in October. The disease was said to have been general and severe in the El Paso Valley during August (GMW, AAD).

Verticillium wilt (V. albo-atrum) was generally distributed in El Paso and Hudspeth Counties, occurring in many fields and causing up to 50% loss in some places. Traces were observed in many fields in Reeves, Ward, Loving, Crane, and Pecos Counties (GMW).

Angular leaf spot (Xanthomonas malvacearum) was seen in all fields in central, north, east, and south Texas, but was nowhere severe. The organism was rarely seen on bolls (GMW). Local occurrence in Maverick



County resulted in 1% loss (SSI). A trace was observed in Bell County (EWL).

Rootknot (Heterodera marioni) was observed causing from a trace to 10% loss in several fields in Nacogdoches and Shelby Counties, and 100% of the plants were attacked in a 1-acre field in Washington County (GMW).

HIBISCUS SABDARIFFA, ROSELLE. Southern blight (Sclerotium rolfsii) caused 10% loss in 1 small experimental planting in Hidalgo County (GMW).

PARTHENIUM ARGENTATUM, GUAYULE. Root rot (Phymatotrichum omnivorum) killed 5% of the plants in a 1-acre planting in Reeves County (GMW), and was abundant in some fields in Hidalgo County (GHG). Crown rot, caused by Phytophthora sp. (according to John T. Presley in verbal communication), killed 10% of the plants in a 1-acre planting in El Paso County (GMW).

RICINUS COMMUNIS, CASTOR BEAN. Leaf spot (Alternaria sp.) was abundant in Hidalgo County in the fall (GHG). Root rot (Phymatotrichum omnivorum) caused a trace of damage in Bell County (EWL).

SACCHARUM, SUGARCANE. Mosaic (virus) occurred generally in small home plantings in east Texas (GMW); in Cherokee County 100% infection was noted in 1 field (PAY).

TARAXACUM KOK-SAGHYZ, KOK-SAGHYZ. Rootknot (Heterodera marioni) was prevalent in plantings of this plant on the Experiment Station in Hidalgo County (GHG).

#### MISCELLANEOUS PLANTS

ABELIA GRANDIFLORA. A trace of chlorosis (nonparasitic) was noted in Bell County (EWL).

CAMELLIA sp. Bud drop (physiogenic) occurred in San Patricio and Aransas Counties (AAD).

CARYA sp. (probably C. BUCKLEYI). Witches'-broom caused by Microstroma juglandis was observed in Smith County (WNE).

CELTIS sp. Limb canker (Septobasidium sydowii) occurred in Bell County (EWL).

CUPRESSUS ARIZONICA. Conifer blight (cause undetermined) was noted in Dallas and Tarrant Counties (AAD, WNE).

EUONYMUS sp. Powdery mildew (Microsphaera alni) occurred in Tom Green and Falls Counties (AAD). Root rot (Phymatotrichum omnivorum) caused 30% loss of plants in Bell County (EWL).

GARDENIA JASMINOIDES. Chlorosis (nonparasitic) caused 5% loss in Bell County (EWL), and was observed in Refugio and Orange Counties (AAD).

GLADIOLUS spp. Leaf and crown rot caused by Rhizoctonia solani was serious at Linn in Hidalgo County (GHG). Dry rot (Sclerotinia gladioli) was observed in Harris County, and bacterial corm decay in Tarrant County (AAD).

IRIS spp. Sclerotium rolfsii, southern blight, was plentiful in Hidalgo County, and basal rot due to Aphelenchoides parietinus also occurred abundantly (GHG).

JUNIPERUS spp. Rust (Gymnosporangium exiguum) was observed in Harris County, and an undetermined conifer blight in Oldham, Young, and Dallas Counties (AAD).

LAGERSTROEMIA INDICA. A trace of powdery mildew (Erysiphe sp.) and 1% damage by nonparasitic chlorosis were observed in Bell County (EWL).

LIGUSTRUM sp. Root rot (Phymatotrichum omnivorum) was observed in

Bell (EWL) and Hidalgo (WNE) Counties, and chlorosis (nonparasitic) in Bell County (EWL).

LILIUM LONGIFLORUM. Bulb rot due to Rhizopus sp. caused considerable loss of stocks for planting in Hidalgo County (GHG).

MAGNOLIA sp. Chlorosis (nonparasitic) occurred in Galveston County (AAD).

NANDINA DOMESTICA. Chlorosis (nonparasitic) was observed in Bell County (EWL), and an undetermined root gall in Bee County (AAD).

PHOENIX spp. Graphiola phoenicis, false smut, was ubiquitous but caused minor damage to P. canariensis in Hidalgo County and P. dactylifera in Dimmit and Hidalgo Counties (GMW), and was observed on the latter species in Nueces County (AAD).

PLUMERIA RUBRA f. TRICOLOR. Root rot (Phymatotrichum omnivorum) occurred in Hidalgo County (WNE).

PYRACANTHA sp. Chlorosis (nonparasitic) was observed in Dallas County (AAD).

QUERCUS VIRGINIANA. Twig blights caused by Coryneum kunzei and Di-plodia longispora were observed in Jefferson County (WNE), and blister leaf (Taphrina caerulescens) in McLennan County (AAD).

ROSA spp. Infection by black spot (Diplocarpon rosae) averaged 10% in Bell County (EWL); was observed in Swisher County (AAD); and caused 25% reduction in growth in east Texas (RDW). In Bell County powdery mildew (Sphaerotheca pannosa) caused 1% loss (EWL); the disease was also observed in Hall County (WNE). Root rot (Phymatotrichum omnivorum) caused 2% loss in Bell County; in the same county an undetermined stem canker caused 1% loss and nonparasitic chlorosis 5% (EWL).

SCHINUS MOLLE. Root rot (Phymatotrichum omnivorum) was observed attacking pepper tree in Webb County (WNE).

SPIRAEA sp. Chlorosis (nonparasitic) occurred in Bell County (EWL).

THUJA sp. Chlorosis (nonparasitic) caused 2% loss of plants in Bell County (EWL).

## PLANT DISEASES IN MONTANA IN 1943

Hubert A. Harris

This report represents a summary of the more important plant diseases observed in Montana during 1943. The observations were obtained during survey activities extending from August 11 to September 26 and are supplemented by data provided by Collaborator H. E. Morris, pathologist of the Montana Agricultural Experiment Station.

### VEGETABLE CROPS

BRASSICA OLERACEA var. CAPITATA, CABBAGE. Fusarium oxysporum f. conglutinans (F. conglutinans) (yellows) was of occasional prevalence. In Ravalli County a medium severity was noted on a trace of the plants.

CUCUMIS SATIVUS, CUCUMBER. Erwinia tracheiphila (wilt) was of general distribution. Observations in Ravalli County indicated heavy severity on a trace to 1% of the plants.

LACTUCA SATIVA, LETTUCE. Sclerotinia sclerotiorum (drop) was of general occurrence. In Ravalli County severity was medium on a trace of the plants.

LYCOPERSICON ESCULENTUM, TOMATO. Corynebacterium michiganense (bacterial canker) was of occasional prevalence. Severity ranging from light to medium on 10% of the plants was observed in Ravalli County.

Fusarium oxysporum f. lycopersici (F. bulbigenum var. lycopersici) (wilt) was of general distribution. Medium severity on a trace of the plants was noted in Missoula County.

PHASEOLUS VULGARIS, BEAN. Fusarium solani f. phaseoli (F. solani var. martii) (root rot) was prevalent in small amounts in nearly all commercial plantings. Pseudomonas medicaginis var. phaseolicola (halo blight) was of general distribution in garden plantings. The Great Northern commercial bean is resistant to the disease. Uromyces phaseoli var. typica (rust) was of general distribution but injury was slight owing to late occurrence. Observations in Treasure and Yellowstone Counties showed medium severity of 65% of the plants. Xanthomonas phaseoli (common blight) occurred in small amounts in occasional fields. Mosaic (virus) commonly occurred in the ordinary selections of Great Northern beans. Idaho 81 and Idaho 123 selections of this variety are highly resistant to mosaic and comprise the chief commercial acreage.

PISUM SATIVUM, PEA. Aphanomyces euteiches (root rot) was of general distribution. In Gallatin County a medium severity on 10 to 15% of the plants was observed. Erysiphe polygoni (powdery mildew) was of general prevalence during the latter part of the season. Medium severity on 98% of the plants was observed in Missoula County. Injury was considered slight owing to the late occurrence. Pseudomonas pisi (bacterial blight) was of occasional prevalence and particularly in fields injured by hail or storm. Light severity on 2% of the plants was noted in Gallatin County.

SOLANUM TUBEROSUM, POTATO. Actinomyces scabies (scab) was of general distribution on susceptible varieties in small amounts. Corynebacterium sepedonicum (ringrot) was of general prevalence in small amounts. Light severity on 2% of the plants was noted in the Bitterroot Valley. Trinia phytophthora (E. carotovora) (blackleg) was approximately of the same distribution as ringrot. It occurred in small amounts, particularly in low and poorly drained soils. In the Bitterroot Valley medium severity was observed on 5% of the plants. Rhizoctonia solani was of general distribution in small amounts.

#### CEREAL AND FORAGE CROPS

AVENA SATIVA, OATS. Puccinia graminis var. avenae (stem rust) was general in the northeastern section of the State. Data obtained in Richland, Sheridan, Valley, and Yellowstone Counties showed a severity ranging from 5 to 40% on 15 to 85% of the plants. The estimated average was 25% severity on 65% of the plants.

Ustilago avenae and U. kolleri (U. levis) (loose and covered smuts) were of general prevalence where seed treatment was not practiced. In Sheridan County a severity of 10% was observed.

HORDEUM VULGARE, BARLEY. Claviceps purpurea (ergot) was of occasional occurrence. It was observed in Gallatin County as a trace with medium severity.

Helminthosporium gramineum (stripe) was of general distribution. Observations in Blaine, Gallatin, and Phillips Counties showed that severity ranged from a trace to heavy on a trace to 95% of the plants. The

estimated average was medium severity on 65% of the plants.

Puccinia graminis (stem rust) was prevalent chiefly in the northeastern section of the State. Data secured from Roosevelt and Valley Counties indicated that severity ranged from 2 to 25% on 5 to 10% of the plants. The estimated average was 15% severity on 5% of the plants.

Ustilago jensenii (*U. hordei*) (covered smut) was general in its distribution, and observations in Fergus, Gallatin, Hill, Roosevelt and Valley Counties indicated a severity ranging from a trace to 1%.

Ustilago ruda (loose smut) was occasional in distribution and severity was even less than that of covered smut.

Xanthomonas translucens (bacterial blight) was observed as a trace with medium severity in Fergus County.

LINUM USITATISSIMUM, FLAX. Melamosora lini (rust) was of general distribution. Data obtained in Choteau, Dawson, Phillips, Richland, Roosevelt, and Sheridan Counties showed a severity ranging from light to heavy on 25 to 98% of the plants. The estimated average was heavy on 75% of the plants. Damage to the seeds was doubtful. Mycosphaerella linorum (*Phlyctaena linicola*) (pasm) was occasional with light severity in the northeastern section of the State. Heat canker (nonparasitic) was of general distribution with light severity.

MEDICAGO SATIVA, ALFALFA. Ascochyta imperfecta (blackstem disease) was observed in Stillwater County with heavy severity of 65% of the plants.

Pseudopeziza medicaginis (leaf spot) was of general prevalence. Observations recorded in Custer, Choteau, Fergus, Gallatin, Phillips, Richland, Stillwater, Sweetgrass, and Yellowstone Counties indicated a severity ranging from light to very heavy on 10 to 98% of the plants. The estimated average was medium severity on 90% of the plants.

Pyrenopeziza medicaginis (leaf blotch) was of general occurrence. Data obtained in Custer, Choteau, Gallatin, Phillips, Stillwater, Sweetgrass, and Yellowstone Counties showed a severity varying from light to heavy on 2 to 50% of the plants. The estimated average was medium severity on 15% of the plants.

Winter injury was more or less general. Injury was more severe in the western third of the State and particularly severe in Gallatin County.

SECALE CEREALE, RYE. Claviceps purpurea (ergot) was of general distribution but more severe in the eastern 2/3 of the State. Light severity on a trace of the plants was observed in Roosevelt County.

TRITICUM AESTIVUM, WHEAT. Puccinia graminis var. tritici (stem rust) was of general distribution but more prevalent in the eastern 2/3 of the State. There was no appreciable loss to the wheat crop. In Dawson, Fergus, Roosevelt, Sheridan, and Valley Counties a severity ranging from 2 to 25% on 2 to 25% of the plants was observed. The estimated average was 10% severity on 10% of the plants.

P. rubigo-vera var. tritici (leaf rust) was of general prevalence on spring wheat. In Gallatin, Roosevelt, Sheridan, and Valley Counties, severity varied from 5 to 40% on 10 to 85% of the plants. The estimated average was 20% severity on 65% of the plants.

Tilletia foetida (*T. levis*) and T. caries (*T. tritici*) (bunt) was of general distribution and more prevalent on winter wheat than spring wheat. Severity ranged from a trace to 1% in Choteau, Fergus, Roosevelt, and Sweetgrass Counties.

ZEA MAYS, CORN. Ustilago maydis (*U. zeae*) was of general prevalence and chiefly as a trace as observed in Blaine, Dawson, Gallatin, Phillips,

Richland, and Yellowstone Counties..

## FRUIT CROPS

**FRAGARIA, STRAWBERRY.** Various fungi causing leaf spots were of general distribution but of slight importance. Medium severity on 50% of the plants was observed in Missoula and Ravalli Counties. Yellows (hereditary leaf variegation) was of general prevalence on the everbearing Progressive berry. Medium severity on 1% of the plants was observed in Ravalli County.

**MALUS SYLVESTRIS, APPLE.** Erwinia amylovora (fireblight) was generally prevalent throughout the apple areas, chiefly as a trace with light to medium severity.

Venturia inaequalis (scab) was of general occurrence in the Flathead Lake and Bitterroot Valley regions. The severity was correlated proportionately to the spray applications practiced, sprayed orchards showing only a trace of the disease. Unsprayed orchards were infected almost 100% and severity ranged from light to heavy on 5 to 90% of the leaves. Severity was light to heavy on 5 to 75% of the fruits. The estimated average was medium severity on 50% of the leaves and medium severity on 25% of the fruits.

Drought spot (physiogenic) occurred occasionally in the Flathead Lake and Bitterroot Valley areas. Severity was medium to heavy on 1 to 25% of the fruits. The estimated average was medium severity on 10% of the fruits.

Jonathan spot (physiogenic) was of occasional occurrence. One orchard in the Flathead Lake vicinity showed light to medium severity on 10% of the fruits of 50% of the trees.

**PRUNUS AVIUM, SWEET CHERRY, and P. CERASUS, SOUET CHERRY.** Coccomyces hiemalis (leaf spot) was of general prevalence. In the Flathead Lake and Bitterroot Valley regions, severity ranged from a trace to light on a trace to 5% of the leaves of 25 to 90% of the trees. The estimated average was light severity on 2% of the leaves of 50% of the trees. Sweet cherries had a lesser amount of infection than sour cherries.

Podosphaera oxycanthae (powdery mildew) was of occasional prevalence in the Flathead Lake vicinity. A medium severity on 2% of the leaves of 5% of the trees was noted.

Winter injury caused a loss of approximately 90% of the cherries this year in the Flathead Lake area.

**PYRUS COMMUNIS, PEAR.** Venturia pyrina (scab) was of occasional prevalence. Light severity on a trace of the leaves and fruits of 10% of the trees was observed in the Bitterroot Valley

## SPECIAL CROPS

**BETA VULGARIS, SUGAR BEET.** Cercospora beticola (leaf spot) occurred chiefly in Richland County with severity medium to heavy on 50 to 95% of the plants. The estimated average was heavy on 75% of the plants. Curly top (virus) was of general prevalence and occurred chiefly as a trace in Blaine, Phillips, Richland, and Yellowstone Counties. Various soil fungi (seedling "black roots") were of general distribution and of heavy severity. Nitrogen deficiency was more or less generally prevalent in the beet areas of Carbon and Yellowstone Counties. Phosphate

deficiency was observed in rotation plots at the U. S. Huntley Field Station. Its occurrence was occasional since the use of a phosphate fertilizer is a standard agronomic practice by many beet growers.

## SUMMARY OF PLANT DISEASES IN WYOMING FOR 1943

E. W. Bodine

This report was prepared with the assistance of the following collaborators: G. H. Starr, Pathologist, Wyoming Agricultural Experiment Station, University of Wyoming, and E. A. Lungren, Pathologist, Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture, Fort Collins, Colorado.

### VEGETABLE CROPS

CAPSICUM FRUTESCENS, PEPPER. Alternaria sp. causing fruit rot was observed in victory gardens in Worland in Washakie County but loss caused was only a trace.

LYCOPERSICON ESCULENTUM, TOMATO. A few plants were found infected with a streak and ringspot type of virus disease near Thermopolis in Hot Springs County. Blossom-end rot (physiogenic) was observed causing a trace of loss in a victory garden in Worland, Washakie County.

PHASEOLUS VULGARIS, BEAN. Fusarium solani f. phaseoli, dry root rot, was general over the entire State. It was most prevalent this year in Big Horn and Washakie Counties. Loss caused amounted to 0.5%.

Pseudomonas (Phytomonas) medicaginis var. phaseolicola, bacterial halo blight, was general in Albany, Big Horn, Goshen, Hot Springs, Park, Sheridan, and Washakie Counties; loss was 0.3%. Xanthomonas (Phytomonas) phaseoli, common bacterial blight, occurred in the same areas as the halo blight, causing 0.2% loss.

Sclerotinia sclerotiorum, white mold, was noted in Big Horn, Park, and Washakie Counties, causing a trace of loss.

Uromyces phaseoli var. typica, rust, occurred in scattered locations in Big Horn, Goshen, Sheridan, and Washakie Counties. The heaviest infection noted was in the Clark Fork area in Park County. Total loss caused was a trace.

Curly top (virus) was observed in Fremont and Sheridan Counties; loss was a trace.

Mosaic, of green and yellow types (virus), was general over the entire State and caused 1.5% loss.

The red-node virus disease was scattered in occurrence in Park and Washakie Counties. Loss was a trace.

PISUM SATIVUM, PEA. Erysiphe polygoni, powdery mildew, was scattered in Albany, Park, and Washakie Counties; loss was a trace. Fusarium solani f. pisi (F. martii var. pisi), root rot, was observed causing a trace of loss in Park County. Uromyces fabae, rust, was observed on the Experiment Station Farm at Laramie.

SOLANUM TUBEROSUM, POTATO. Diseases of general occurrence throughout the State, with estimates of losses caused, were: Actinomyces scabies, scab, 2%; Alternaria solani, early blight, 0.5%; Corynebacterium sepedonicum, ringrot, 2%; Erwinia phytophthora (E. atroseptica), 0.5%; Fusarium



solani f. cumartii, wilt, with 1.5%; F. oxysporum, wilt, 1%; Rhizoctonia solani, with 1%; and the virus diseases, hay-wire with 0.5%; leaf roll, 1%; mosaic, 0.5%; and spindle tuber, 0.7%.

Psyllid yellows, induced by the psyllid Paratrioza cockerelli, was scattered over the entire State, and caused 0.5% loss.

TRAGOPOGON PORRIFOLIUS, SALSIFY. Albugo tragopogonis, white rust, was noted in trace amounts in Albany and Washakie Counties.

## CEREALS

AVENA SATIVA, OATS. Pseudomonas (Phytomonas) coronafaciens, halo-blight, was observed on the Experiment Station Farm at Laramie in Albany County. Puccinia coronata, crown rust, P. graminis var. avenae, stem rust, Ustilago avenae, loose smut, and U. kolleri (U. levis), covered smut, were general over the entire State. Percentage losses in 1943 were estimated as: crown rust, 0; stem rust 0.5; loose smut, a trace; and covered smut 1.

HORDEUM VULGARE, BARLEY. Claviceps purpurea, ergot, and Helminthosporium sativum, were observed on the Experiment Station Farm at Laramie in Albany County. Loss from each was a trace. Helminthosporium gramineum, stripe, was observed in Albany, Fremont, Goshen, Laramie, and Platte Counties, causing only a trace of loss.

Puccinia anomala (P. simplex), leaf rust, and P. graminis var. tritici, stem rust, were both scattered in distribution in Albany, Fremont, Goshen, Laramie, and Platte Counties. Each caused a trace of loss.

Ustilago jensenii (U. hordei), covered smut, and U. nuda, loose smut, were general over the entire State. Loss estimates were a trace for covered smut and 0.5% for loose smut.

MEDICAGO SATIVA, ALFALFA. Corynebacterium insidiosum, bacterial wilt, was general over the entire State and caused loss estimated at 5%.

Peronospora trifoliorum, downy mildew, occurred in the western and eastern parts of Wyoming; loss was a trace.

Pseudopeziza medicaginis, leaf spot, was general but caused a trace of loss.

SECALE CEREALE, RYE. Puccinia graminis var. secalis, stem rust, was scattered over the State; no loss was caused.

TRITICUM AESTIVUM, WHEAT. Erysiphe graminis var. tritici, powdery mildew and Helminthosporium sp. causing foot rot, were general over the entire State, and loss from each was a trace.

Puccinia graminis var. tritici, stem rust, was scattered in occurrence in the winter wheat areas in the State and loss ranged from none to a trace; while in the spring wheat areas occurrence was general and resulted in losses of a trace to 0.5%. Infection by P. rubigo-vera var. tritici (P. triticea), leaf rust, was scattered in both winter wheat areas and spring wheat areas in the State and losses to both ranged from none to a trace.

Tilletia foetida (T. laevis) and T. caries (T. tritici), bunt, occurred in Albany, Goshen, and Laramie Counties, the former causing 0.5% loss, the latter a trace.

Ustilago tritici, loose smut, was scattered over the wheat areas in the State. Loss was a trace.

ZEA MAYS, CORN. Fusarium moniliforme, ear rot; Fusarium sp., seedling blight and Ustilago maydis (U. zeae), smut, were all generally distributed over the entire State. Losses estimated were a trace from ear rot, 1% from seedling blight, and 3% from smut.



## MISCELLANEOUS CROPS

BETA VULGARIS, SUGAR BEET. Cercospora beticola, leaf spot, was general in Big Horn, Goshen, Hot Springs, Sheridan, and Washakie Counties. Loss was estimated at a trace. Fusarium sp., root rot was general in Big Horn, Fremont, Goshen, Hot Springs, Sheridan and Washakie Counties. Loss averaged 1%. Pythium sp., Rhizoctonia solani, and Fusarium sp. causing damping-off and black root, were general in the sugar beet areas of the State. Loss was 0.5%. Rhizoctonia solani causing crown rot and root rot, was general in Big Horn, Fremont, Goshen, Hot Springs, Sheridan and Washakie Counties; loss averaged 1%. Curly-top (virus), occurred in Big Horn, Fremont, Hot Springs, Johnson, Sheridan and Washakie Counties, causing a trace of loss. Mosaic (virus) was scattered in the sugar beet districts of the State. Loss was a trace.

MALUS SYLVESTRIS, APPLE. Erwinia amylovora, Fireblight, was general over the entire State and caused 4% loss.

SUMMARY OF PLANT DISEASES IN COLORADO FOR 1943

E. W. Bodine

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## VEGETABLE CROPS

ALLIUM CEPA, ONION. Botrytis allii, neck rot, was observed in Crowley, Otero, and Pueblo Counties, occurring mostly as a storage trouble. Storage loss in 1942 amounted to 3%; for 1943 it is not yet determined. A trace of infection occurred in the field.

Fusarium oxysporum f. cepae (F. zonatum), basal bulb rot, was general over the entire State in the onion-growing districts; loss amounted to 0.2%.

Alternaria (Macrosporium) porri, purple blotch, occurred in Crowley, Otero, and Pueblo Counties, where it was very prevalent. Storage loss in 1942 was 5%. Field infection in Otero and Pueblo Counties in 1943, was heavy, while in Morgan County it was slight. Storage loss for 1943 is undetermined.

Peronospora destructor (P. schleideni), downy mildew, was observed at Littleton in Arapahoe County but caused no loss.

Phoma terrestris, pink root, occurred in Arapahoe, Delta, Montrose, and Otero Counties and caused a trace of loss.

Urocystis cepulae, onion smut, was found in Weld County; loss was a trace.

**APIUM GRAVEOLENS, CELERY.** Cercospora apii, early blight, occurred in Adams, Arapahoe, Denver, Fremont, Jefferson, and Pueblo Counties and resulted in loss of a trace. Erwinia carotovora, soft rot, was observed in Denver, Jefferson, and Larimer Counties. Loss in the field in 1943 was a trace. Fusarium oxysporum f. apii, Fusarium yellows, occurred in Adams, Arapahoe, Denver, Fremont, Jefferson, and Pueblo Counties and caused 0.5% loss in 1943. Pythium debaryanum, damping-off, was general in seedbeds. The highest loss was recorded in Adams and Fremont Counties. Sclerotinia sclerotiorum, pink rot, occurred in Adams, Arapahoe, Denver, Fremont, and Jefferson Counties. In 1942, trenched Pascal celery suffered 10% loss. The loss in 1943 is not determined. Septoria apii, late blight, was common in all celery growing districts in the State. Loss in 1943 was estimated as 3.9%. Celery mosaic (virus 1- southern type) was general in celery growing districts in the State. A moderate amount was present in Jefferson County. Loss in 1943 amounted to a trace.

**ASPARAGUS OFFICINALIS, ASPARAGUS.** Puccinia asparagi, rust, was observed in Larimer County on wild asparagus. All commercial fields are planted to the Martha Washington resistant variety.

**BETA VULGARIS, GARDEN BEET.** Cercospora beticola, leaf spot, was general over the entire State; loss was a trace. Black heart due to phosphate deficiency was general in Otero County, causing loss amounting to 1%.

**BRASSICA OLERACEA var. CAPITATA, CABBAGE.** Erwinia carotovora, soft rot, was general over the entire State, causing loss of a trace. Fusarium oxysporum f. conglutinans, yellows, was observed in Adams, Arapahoe, Costilla, Conejos, Denver, Jefferson, and Weld Counties. In past years it has been most severe in Adams, Arapahoe, Denver, and Jefferson Counties. Resistant varieties are now grown exclusively. Losses in affected fields in 1943 ranged from none to a trace.

**CAPSICUM FRUTESCENS, PEPPER.** Alternaria sp., fruit rot, was general in occurrence over the entire State, but loss was a trace. Phytophthora capsici, blight, was observed in Adams, Arapahoe, Denver, Fremont, Jefferson, Otero, and Pueblo Counties, causing loss of 2%. Mosaic (virus) was generally distributed and resulted in a loss of 0.5%. A ringspot type of virus was general and caused a trace of loss over the eastern slope of Colorado.

**CUCUMIS MELO, CANTALOUPE.** Erwinia tracheiphila, wilt, caused a trace of loss in Bent, Crowley, Otero, and Pueblo Counties. A trace of Erysiphe cichoracearum, powdery mildew, was observed in McElmo Canyon, Montezuma County. Alternaria cucumerina (Macrosporium cucumerinum), leaf blight, occurred in Bent, Crowley, Otero, and Pueblo Counties and caused loss of 5%. Phytophthora capsici, fruit rot, caused 1% loss in Bent, Crowley, Otero, and Pueblo Counties.

**CUCUMIS MELO, HONEY-DEW.** Colletotrichum lagenarium, anthracnose, occurred in Pueblo County. Loss amounted to 1%. Phytophthora capsici, fruit rot, in Crowley and Pueblo Counties, caused 2% loss.

**CUCUMIS SATIVUS, CUCUMBER.** Erwinia tracheiphila, wilt, was general over the entire State. Mosaic (virus) was observed in Larimer, Mesa, and Weld Counties. Each disease caused a trace of loss.

**CUCURBITA MAXIMA, SQUASH.** Fusarium sp., root rot and wilt, caused a trace of loss in Arapahoe, Jefferson, and Larimer Counties. Attack by mosaic (virus) in Arapahoe and Jefferson Counties resulted in 6% loss.

DAUCUS CAROTA, CARROT. Erwinia carotovora, soft rot, was general over the entire State but loss was a trace. Aster yellows (virus) caused 3% loss in Jefferson County.

LACTUCA SATIVA, LETTUCE. Pythium debaryanum, damping-off, caused 2% loss in seedbeds in Fremont and Rio Grande Counties. Mosaic (virus) was noted in Fremont County where it caused loss amounting to 10%. Tip-burn (physiogenic) caused 3% loss in Rio Grande County.

LYCOPERSICON ESCULENTUM, TOMATO. Alternaria solani (early blight), Fusarium oxysporum f. lycopersici (Fusarium wilt), Corynebacterium michiganense (bacterial canker) which occurred mostly in Victory gardens, and Verticillium albo-atrum (wilt), were of general occurrence throughout the State and each caused a trace of loss. Cladosporium fulvum (leaf mold) caused a trace of loss in Denver greenhouses. Phytophthora capsici (fruit rot) caused traces of loss in Adams, Arapahoe, Jefferson, Larimer, Otero, Pueblo, and Weld Counties. None was found on the western slope of Colorado.

Of the virus diseases, aucuba mosaic was general in occurrence and caused 0.5% loss. Curly-top occurred on the western slope but caused no loss. A ringspot type of virus disease was general throughout the eastern slope but was mostly confined to Victory gardens and loss was 0.2%. Spotted wilt was observed to the extent of a trace in Denver, Jefferson, and Mesa Counties.

Blossom-end rot and sunscald (physiogenic) were both general over the entire State causing losses of 0.1% and 2%, respectively. A high percentage of the fruit was sunscalded on the Cardinal variety in Mesa County.

PHASEOLUS VULGARIS, BEAN. Fusarium solani f. phaseoli (F. martii var. phaseoli), dry root rot, was observed in Delta, Elbert, El Paso, Lincoln, Mesa and Pueblo Counties. It was most severe in Mesa County. Loss in 1943 was estimated at 2%. Pseudomonas medicaginis var. phaseolicola, bacterial halo blight, and Xanthomonas phaseoli, common bacterial blight, were both general in distribution and caused losses amounting to a trace. Uromyces phaseoli var. typica, rust, was general but most severe in Weld County. Loss was a trace.

Mosaic (yellow and green types, virus) was general over the entire State, and caused 1% loss. Red node virus disease was also general but caused a trace of loss.

A nonparasitic trouble was noted in Mesa County where it caused 2% loss.

PISUM SATIVUM, PEA. Erysiphe polygoni (powdery mildew) was observed causing a trace of loss in the vicinity of Del Norte in Rio Grande County. Xanthomonas (Phytomonas) pisi (bacterial blight) occurred in Conejos County, where it caused 1% loss.

Asochyta pinodella, (root rot) occurred in Del Norte, Rio Grande County where it caused 1% loss. Pythium sp. (root rot) was general over the entire State and caused a trace of loss. Root rots due to Fusarium solani f. pisi (F. martii var. pisi) and to Rhizoctonia solani were also generally distributed; these diseases, however, were more prevalent in the San Luis Valley. Fusarium caused 2% loss, Rhizoctonia a trace.

SOLANUM MELONGENA, EGGPLANT. Verticillium albo-atrum, wilt, was observed in the northern part of Colorado causing a trace of loss.

SOLANUM TUBERCOSUM, POTATO. Actinomyces scabies (scab) occurred generally; however, it was most prevalent in Garfield and Weld Counties. Loss was 2%.

Fusarium solani f. eumartii (wilt) was general but most prevalent in the northern and northeastern sections; loss was 1%.

Fusarium javanicum var. radicicola (jelly end rot) was generally distributed but most prevalent on the western slope; loss was a trace.

Other diseases of general occurrence include Alternaria solani (early blight) with 0.5% loss; Corynebacterium sepedonicum (ringrot) 2%; Erwinia phytophthora (E. atroseptica) (blackleg) 0.5%; Fusarium oxysporum, (wilt) 0.3%; Rhizoctonia solani, 0.5%; and seed piece decay due to Fusarium sp. and Erwinia carotovora which caused 3% loss in stands.

Fusarium solani (wilt) was general in fields in the San Luis Valley where loss was 0.2%. Fusarium trichothecioides (powdery dry rot) occurred in the San Luis Valley and in Weld County and caused a trace of loss.

Phytophthora infestans (late blight) was general in Morgan and Weld Counties. Loss in the two counties, as far as evident to date, amounted to 2%.

Except for calico which was scattered in distribution and caused no loss, virus diseases were general in occurrence. Losses estimated were 0.1% from giant hill, 0.8% from haywire, 1% from leaf roll, 0.4% from mild and crinkle mosaic, 0.2% from rugose mosaic and 0.8% from spindle tuber.

Growth crackings and sun scald occurred generally but were most prevalent in the San Luis Valley. Loss amounted to 2% from growth cracks and 1% from sun scald. Hollow heart also was general; loss was a trace.

TRAGOPOGON PORRIFOLIUS, SALSIFY. Albugo tragopogoni, white rust, was noted in Larimer County.

#### CEREALS, GRASSES, AND FORAGE CROPS

AVENA SATIVA, OATS. Puccinia coronata, crown rust, was scattered in distribution and caused no loss.

Puccinia graminis var. avenae, stem rust, Ustilago avenae, loose smut, and U. kolleri (U. levis), covered smut, were general over the State and each caused a trace of loss.

BROMUS spp., BROME GRASS. Claviceps purpurea, ergot, was noted on Bromus inermis (smooth brome grass) in Larimer County. Ustilago bromivora, smut, occurred on B. tectorum (downy brome grass) in the foothills of Larimer County.

HORDEUM VULGARE, BARLEY. Claviceps purpurea (ergot) occurred to the extent of a trace in Larimer County. Other diseases observed were generally distributed in the State. Erysiphe graminis (powdery mildew), Helminthosporium gramineum (stripe), Puccinia graminis var. tritici (stem rust), and Ustilago jensenii (U. hordei) (covered smut) caused traces of loss.

Ustilago nuda (loose smut) caused 1% loss. No loss was caused by Puccinia anomala (P. dispersa) (leaf rust).

MEDICAGO SATIVA, ALFALFA. Corynebacterium insidiosum (bacterial wilt) and Pseudopeziza medicaginis (leaf spot) both were general in occurrence and each caused loss estimated at 1%.

Peronospora trifoliorum (downy mildew) was noted causing a trace of damage in Boulder, Laramie, and Weld Counties. Mosaic (virus) was general over the entire State but loss was a trace.

SECALE CEREALE, RYE. Claviceps purpurea, ergot, caused a trace of loss in Larimer County. Puccinia graminis var. secalis, stem rust, occurred on rye in Larimer and Weld Counties but caused no loss.

SORGHUM VULGARE, SORGHUM. Fusarium sp.-Pythium sp.. seedling blight complex was general over the entire State and resulted in 1% reduction in stand.

Sphacelothecia sorghi, covered kernel smut, was also general; loss was 2%.

TRITICUM AESTIVUM, WHEAT. Erysiphe graminis var. tritici (powdery mildew) was general and caused a trace of loss for both winter and spring wheat.

Helminthosporium sativum (dryland foot-rot) occurred in northeastern and eastern Colorado; loss was 1%.

Puccinia graminis var. tritici (stem rust) was general over the entire State on both winter and spring wheat. Loss to winter wheat ranged from none to a trace; on spring wheat from a trace to 1%. Heaviest losses in spring wheat occurred in Archuleta, La Plata, and Montezuma Counties.

P. rubigo-vera var. tritici (P. triticea) (leaf rust) was general and caused losses ranging from none to a trace on both winter and spring wheat.

Septoria tritici (speckled leaf blotch) caused a trace of loss in northeastern Colorado.

Tilletia foetida (T. laevis) (bunt) was general and caused a trace of loss while T. caries (T. tritici) was observed in Routt County, where loss ranged from none to a trace.

Ustilago tritici (loose smut) was general; loss was not more than a trace.

ZEA MAYS, CORN. Fusarium moniliforme (ear and seed rot), Pythium sp. and Fusarium sp. causing seedling blights, were general over the entire State and caused losses estimated at a trace to 1%.

Ustilago maydis (U. zeae) (smut) was also general; loss was 1%.

Puccinia sorghi (rust) was observed in Conejos County.

Sclerotium bataticola (charcoal rot) had been found in Baca County in 1942 but none was found in 1943.

#### FRUIT AND NUT CROPS

AMYGDALUS COMMUNIS, ALMOND. Peach mosaic (virus) was found only in Mesa County when artificially inoculated into almond trees.

AMYGDALUS PERSICA, PEACH. Coryneum carpophilum (C. beijerinckii, Helminthosporium carpophilum), blight, was observed in Delta and Mesa Counties and in Paradox Valley in Montrose County; loss was a trace. Poria sp., white heart rot, occurred in the Redlands district of Mesa County. Rhizopus nigricans, black mold rot, was found only on dead ripe fruit in orchards in Delta and Mesa Counties; loss ranged from none to a trace. Sphaerotheca pannosa, powdery mildew, and Agrobacterium tumefaciens, crown gall, caused losses amounting to a trace in Delta and Mesa Counties. Taphrina deformans, leaf curl, was found in Mesa County, on nursery stock shipped in from the northwestern part of the United States.

The virus diseases golden net and X-disease were observed in Mesa County, causing loss ranging from none to a trace. Peach mosaic occurred in Mesa and Montezuma Counties; loss was 0.5%.

Chlorosis (nonparasitic) was observed in Delta, Mesa, Montezuma, and Montrose Counties. Of all the peach trees in Colorado 25% show symptoms of chlorosis. Usually No. 2 fruit is produced on affected trees, which amounts to 75,000 bushels. Gummosis (physiogenic) also occurred in Delta, Mesa, Montezuma, and Montrose Counties; loss was a trace.

AMYGDALUS PERSICA var. NECTARINA, NECTARINE. Peach mosaic (virus) was noted in Mesa County, causing loss of a trace; and chlorosis (physiogenic) in Delta and Mesa Counties.

FRAGARIA, STRAWBERRY. Black root due to a complex of organisms was general over the entire State, attack resulting in 1% loss.

Mycosphaerella fragariae, leaf spot, caused a trace of loss in Jefferson and Larimer Counties.

Phytophthora fragariae, red stele, was generally distributed, causing loss estimated at 2.5%.

Xanthosis (virus) was observed in trace amounts in Larimer County.

MALUS SYLVESTRIS, APPLE. Erwinia amylovora, fireblight, occurred generally but was more prevalent in the North Fork district in Delta County and the Canon City area in Fremont County. Loss was 2.5%. Podosphaera sp., powdery mildew, was observed in trace amounts in Fremont County. Venturia inaequalis, scab, occurred in Morgan County but no loss resulted.

PRUNUS sp., CHERRY. Agrobacterium (Phytopomonas) tumefaciens (crown gall) occurred generally wherever cherries were grown, but loss was a trace. Podosphaera oxycanthae (powdery mildew), was noted in trace amounts in Jefferson and Larimer Counties. Schizophyllum commune, sap rot, caused a trace of damage in Larimer County. Mosaic (virus) was general in Mesa County on the Royal Duke variety. Loss was a trace. Rasp-leaf (virus) was prevalent in Delta County, and occurred to a slight extent in Mesa County. Loss was 0.5%.

PRUNUS AMERICANA, AMERICAN WILD PLUM. Dibotryon morbosum (Plowrightia morbosa), black knot, and Taphrina pruni, plum pockets, were observed in the foothills in Larimer County.

PRUNUS ARIENZIACA, APRICOT. Coryneum carpophilum (C. beijerinckii) (blight) caused a trace of loss in Delta and Mesa Counties.

Ringspot (virus) caused 0.5% loss in Mesa County. Chlorosis (nonparasitic) occurred in Delta, Mesa, Montezuma, and Montrose Counties, causing loss of a trace.

PYRUS COMMUNIS, PEAR. Erwinia amylovora (fireblight) and chlorosis (nonparasitic) were observed causing traces of loss in Delta and Mesa Counties. Phosphorus deficiency was noted in Mesa County; loss was a trace.

RUBUS sp., RASPBERRY. Mycosphaerella rubina, spur blight, mosaic (virus) and winter injury were scattered in occurrence over the State. Losses were a trace from spur blight and 1% each from mosaic and winter injury.

#### SPECIAL CROPS

BETA VULGARIS, SUGAR BEET. Cercospora beticola, leaf spot, was general over the entire State. Heavy infections were noted in some fields in Boulder, Larimer, Otero, Pueblo, and Weld Counties. Loss was 2.5%.

Heterodera schachtii, the sugar beet nematode, occurred in Larimer County, causing a trace of loss.

Pythium butleri, root rot, was general over the eastern slope of Colorado. Loss was a trace. Pythium sp., Rhizoctonia solani, Phoma betae, and Fusarium sp. causing damping-off and black root, were general over the entire State; causing loss amounting to 1%. Rhizoctonia solani, causing root rot, was also generally distributed over the entire State. In some fields a high percentage of the plants were infected. Loss was 1%.



Verticillium albo-atrum, wilt, was observed in Weld County; loss was a trace.

The virus diseases caused traces of loss. Curly top was observed in Delta, Mesa, and Montrose Counties; mosaic was general over the entire State; savoy was noted in Larimer County; and vein mosaic in Larimer and Weld Counties.

Black heart due to phosphate deficiency was general over the eastern slope of Colorado and caused a trace of loss.

#### MISCELLANEOUS CROPS

ACER spp. Pleurotus ulmarius, white sap rot, was noted on Acer negundo, box elder, in Larimer County; and Cytospora chrysosperma, canker, on Acer sp. in El Paso County.

ALTHAEA ROSEA. Puccinia malvacearum (rust) was general over the entire State.

ANTIRRHINUM MAJUS. Puccinia antirrhini, rust, was general over the entire State.

BEGONIA sp. Botrytis sp., blight, and Xanthomonas (Phytomonas) begoniae, leaf spot, caused a trace of loss in Denver and Larimer Counties.

BERBERIS VULGARIS. In La Plata County the aecial stage of Puccinia graminis, stem rust was prevalent on the barberry. Adjacent wheat fields were heavily infected with stem rust.

CALLISTEPHUS CHINENSIS. Fusarium oxysporum f. callistephi (F. conglutinans var. callistephi), wilt, was general and caused a trace of loss in Denver and Jefferson Counties. Aster yellows (virus) was general over the entire State; loss was a trace.

CHRYSANTHEMUM sp. Erysiphe cichoracearum, powdery mildew, and mosaic (virus) were observed in Jefferson County; loss from the former was a trace, from mosaic 0.5%.

DAHLIA sp. Mosaic (virus) was observed in trace amounts in Jefferson County.

DELPHINIUM sp. Erysiphe polygoni, powdery mildew, was noted in Larimer County. No loss resulted.

DIANTHUS CARYOPHYLLIUS. Alternaria dianthi (branch rot and leaf spot), Fusarium oxysporum f. dianthi, (wilt), and Uromyces caryophyllinus (rust) were noted in Denver greenhouses, where each caused a trace of loss.

GARDENIA sp. Fusarium sp. caused root rot in Denver greenhouses, resulting in loss of a trace.

GLADIOLUS sp. Fusarium sp. (root rot), and Pseudomonas (Phytomonas) marginata, scab, were general over the entire State. Losses were a trace and 1.5%, respectively.

HYDRANGEA sp. Erysiphe polygoni, powdery mildew, was noted in Larimer County.

IRIS sp. Didymellina iridis, leaf spot, occurred generally over the entire State and caused a trace of loss.

Puccinia iridis, rust, was observed on wild iris in Larimer County.

LATHYRUS ODCRATUS. Erysiphe polygoni (powdery mildew), and Fusarium solani f. pisi (F. martii var. pisi) (root rot) were general over the entire State. Each caused a trace of loss.



MENTHA sp. Puccinia menthae, rust, was observed in Larimer County.  
 NARCISSUS sp. Fusarium sp., bulb rot, was observed in Denver greenhouses where it caused a trace of loss.

PAEONIA sp. Botrytis paeoniae, blight, was general in distribution and caused a trace of damage.

PRUNUS VIRGINIANA. Podosphaera oxycanthae (powdery mildew) was observed in Jefferson and Larimer Counties.

ROSA sp. Diplocarpon rosae (black spot) was noted in Denver greenhouses, Phragmidium sp. (rust) in Larimer County, and Agrobacterium (Phytoplasma) tumefaciens (crown gall) and Sphaerotheca pannosa (powdery mildew) were general over the entire State. Loss from each disease was a trace.

TULIPA sp. Botrytis tulipae, Botrytis blight, was noted in Larimer County.

ZINNIA ELEGANS. Erysiphe cichoracearum, powdery mildew, was general over the entire State, and caused a trace of damage.

### PLANT DISEASES OBSERVED IN ARIZONA AND NEW MEXICO, 1943

Wm. G. Hoyman

#### VEGETABLE CROPS

ABELMOSCHUS ESCULENTUS, OKRA. Fusarium oxysporum f. vasinfectum, wilt, occurred in Arizona. Heterodera marioni, rootknot, was noted in New Mexico.

ALLIUM CEPA, ONION. Phoma terrestris, pink root, was observed in Arizona.

APIUM GRAVEOLENS, CELERY. Septoria apii, late blight, was noted in New Mexico.

ASPARAGUS OFFICINALIS, ASPARAGUS. Cercospora asparagi occurred in New Mexico.

BETA VULGARIS, GARDEN BEET, and var. CICLA, SWISS CHARD. Cercospora beticola occurred on beets in both States. Fusarium sp. was noted on beets in Arizona, and curly top (virus), on beets and Swiss chard in the same State.

BRASSICA spp. Erysiphe polygoni, powdery mildew, was observed on rutabaga in New Mexico, on turnip in both States, and on mustard (B. juncea) in Arizona. Phoma lingam, blackleg, occurred on cabbage and cauliflower in New Mexico. Sclerotinia sclerotiorum, watery soft rot, was observed on cabbage and Chinese cabbage in Arizona. Xanthomonas campestris, black rot, was noted on cabbage in both States. Heterodera marioni, rootknot, was noted on rutabaga and Chinese cabbage in Arizona.

CAPSICUM FRUTESCENS, PEPPER. Wilt (Fusarium annuum), curly top (virus), and sun scald (nonparasitic), affected both bell and chili peppers in both States. On chili peppers blossom-end rot (physiogenic) was observed in both States, and mosaic (virus) in Arizona. Paprika peppers in Arizona were affected by Fusarium wilt, curly top, and mosaic.

CICHORIUM ENDIVIA, ENDIVE. Sclerotinia sclerotiorum, watery soft rot, was observed in Arizona.

CITRULLUS VULGARIS, WATERMELON. Colletotrichum lagenarium, anthracnose, occurred in both States. Alternaria cucumerina, leaf blight, and Heterodera marioni, rootknot, were observed in Arizona.

CUCUMIS MELO, CANTALOUPE. Alternaria cucumerina, leaf blight, and Erysiphe cichoracearum, powdery mildew, were observed in Arizona.

CUCUMIS SATIVUS, CUCUMBER. Erysiphe cichoracearum occurred in New Mexico.

CUCURBITA PEPO, PUMPKIN. Erysiphe cichoracearum and mosaic (virus) were observed in New Mexico.

CUCURBITA PEPO, SUMMER SQUASH. Erysiphe cichoracearum, Fusarium oxysporum f. niveum (wilt), and the virus diseases curly top and mosaic were noted in Arizona.

DAUCUS CAROTA, CARROT. Alternaria carotae (leaf blight), and Cuscuta sp. (dodder) were observed in New Mexico, and Heterodera marioni (rootknot) in Arizona.

IPOMOEA BATATAS, SWEETPOTATO. Monilochaetes infusans (scurf) and Rhizopus nigricans (soft rot) occurred in both States; Phymatotrichum omnivorum (root rot) and Sclerotium rolfsii (southern blight) in Arizona; and Endocnidiophora (Ceratostomella) fimbriata in New Mexico.

LACTUCA SATIVA, LETTUCE. Drop or watery soft rot (Sclerotinia sclerotiorum), the virus diseases mosaic and big vein, and tipburn (physiogenic) were observed in Arizona.

LYCOPERSICON ESCULENTUM, TOMATO. Alternaria solani (early blight), Fusarium oxysporum f. lycopersici (Fusarium wilt), Heterodera marioni (rootknot), curly top (virus), blossom-end rot (physiogenic), phosphorus deficiency, and psyllid yellows induced by the tomato psyllid, were all observed in both States. Spotted wilt (virus) occurred in Arizona.

PHASEOLUS LUNATUS, LIMA BEAN. Witches' broom (virus) was found in Arizona.

PHASEOLUS VULGARIS, BEAN. Powdery mildew (Erysiphe polygoni), dry root rot (Fusarium solani f. phaseoli) (F. martii var. phaseoli), rootknot (Heterodera marioni), rust (Uromyces phaseoli var. typica), and the virus diseases mosaic and witches' broom were observed in Arizona. Bacterial blight (Xanthomonas phaseoli) occurred in both States.

PHASEOLUS VULGARIS, MEXICAN PINK BEAN. Xanthomonas phaseoli (bacterial blight), curly top (virus), and mosaic (virus), occurred in Arizona.

PHASEOLUS VULGARIS, PINTO BEAN. Rust and bacterial blight were observed on pinto bean in both States. Rootknot and dry root rot were noted in Arizona; powdery mildew and curly top in New Mexico.

PISUM SATIVUM, PEA. Root rot (Fusarium solani f. pisi) was noted in New Mexico; rootknot (Heterodera marioni) in Arizona.

SOLANUM MELONGENA, EGGPLANT. Fusarium sp. was observed in Arizona. Verticillium wilt (V. albo-atrum) occurred in New Mexico.

SOLANUM TUBEROSUM, POTATO. Early blight (Alternaria solani), bacterial ringrot (Corynebacterium sepedonicum), and psyllid yellows occurred in both States. Scab (Actinomyces scabies), wilt (Fusarium oxysporum), Rhizoctonia (R. solani), and second growth due to weather conditions were observed in Arizona; and blackleg (Erwinia phytophthora) in New Mexico.

SPINACIA OLERACEA, SPINACH. Root rot (Fusarium sp.) occurred in Arizona.

## CEREALS AND FORAGE CROPS

AVENA SATIVA, OAT. Loose smut (Ustilago avenae) occurred in Arizona.

CYALOPSIS TETRAGONLOBUS, GUAR. Fusarium sp. was noted in Arizona.

MEDICAGO SATIVA, ALFALFA. Corynebacterium insidiosum (bacterial wilt), Cuscuta sp. (dodder), Peronospora trifoliorum (downy mildew), Phymatotrichum omnivorum (root rot), Pseudopeziza medicaginis (leaf spot), rust (Uromyces striatus var. medicaginis) and girdle due to insect activity were noted in both States. Colletotrichum trifolii (anthracnose), Fusarium oxysporum f. medicaginis (wilt), Rhizoctonia solani (stem canker) and the virus diseases mosaic and witches' broom were observed in Arizona. Ascochyta imperfecta and white spot (nonparasitic) occurred in New Mexico.

SECALE CEREALE, RYE. Bacterial blight (Xanthomonas translucens f. sp. secalis) was observed in Arizona.

SOJA MAX, SOYBEAN. Bacterial pustule (Xanthomonas phaseoli var. sojense) occurred in Arizona.

SORGHUM VULGARE, SORGHUM. Xanthomonas holcicola was observed on sorghum in New Mexico; Pseudomonas syringae on sudan grass (S. vulgare var. sudanense) in Arizona.

ZEA MAYS, CORN. Ustilago maydis (smut) was noted on field corn in both States and on sweet corn in Arizona.

## FRUIT AND NUT CROPS

AMYGDALUS PERSICA, PEACH. Mosaic (virus), iron and nitrogen deficiency, and immature fruits produced by the Hale variety, were observed in both States. Agrobacterium tumefaciens (crown gall) and wart (virus) occurred in Arizona; Phymatotrichum omnivorum (root rot) in New Mexico.

CARYA ILLINOENSIS, PECAN. Phymatotrichum omnivorum (root rot) occurred in Arizona, and rosette (nonparasitic) was observed in both States.

CITRUS PARADISI, GRAPEFRUIT. Psorosis A (virus), decline disease (undetermined), and iron and zinc deficiency were observed in Arizona.

CITRUS SINENSIS, ORANGE. Fruit rot (Alternaria citri), psorosis A, decline, and zinc deficiency were observed in Arizona.

FRAGARIA, STRAWBERRY. Leaf spot (Mycosphaerella fragariae), fruit rots (Phytophthora cactorum and Rhizopus nigricans), and iron deficiency were noted on strawberry in Arizona.

MALUS SYLVESTRIS, APPLE. Phymatotrichum omnivorum was observed attacking apple in Arizona. Erwinia amylovora (fireblight) and Podosphaera leucotricha (powdery mildew) occurred in New Mexico. Iron deficiency was noted in both States.

PRUNUS sp., PLUM. Crown gall (Agrobacterium tumefaciens), rootknot (Heterodera marioni), and root rot (Phymatotrichum omnivorum) were observed in Arizona.

PRUNUS ABEIICACA, APRICOT. Apricots in Arizona were affected by iron deficiency.

PRUNUS AVIUM, SWEET CHERRY. Crown gall (Agrobacterium tumefaciens) was observed in New Mexico.

PYRUS COMMUNIS, PEAR. Fireblight (Erwinia amylovora) occurred on pear trees in Both States.

RIBES GROSSULARIA, GOOSEBERRY. Crown gall (Agrobacterium tumefaciens) was noted in Arizona.

RUBUS sp., BOYSENBERRY. Mycosphaerella rubi was observed in Arizona.

VITIS sp., GRAPE. Iron deficiency was noted in New Mexico.

#### SPECIAL CROPS

ARACHIS HYPOGAEA, PEANUT. Phymatotrichum omnivorum (root rot) was observed in Arizona; Sclerotium rolfsii (southern blight) in New Mexico.

BETA VULGARIS, SUGAR BEET. Leaf spot (Cercospora beticola) and curly top (virus) affected sugar beets in both States. Mosaic (virus) and nitrogen deficiency were observed in Arizona.

GOSSYPIUM, COTTON. Cotton in both States was affected by Alternaria sp. (leaf spot), Phymatotrichum omnivorum (root rot), Puccinia stakmanii (P. boutelouae) (rust), Verticillium albo-atrum (wilt), Xanthomonas malvacearum (angular leaf spot), and nitrogen deficiency. Fusarium roseum occurred on the bolls in Arizona.

PARTHENIUM ARGENTATUM, GUAYULE. Fusarium sp. was observed attacking this plant in Arizona.

SALVIA OFFICINALIS, SAGE. Heterodera marioni (rootknot) occurred in Arizona.

#### OBSERVATIONS ON PLANT DISEASES IN UTAH DURING 1943

Seth Barton Locke

#### Collaborators

##### Utah Agricultural Experiment Station

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Mr. H. V. Swenson, Inspector, Utah County

Mr. L. Wynn, District Inspector, Cache and Boxelder Counties.

#### Major Pathological Problems

Bacterial Wilt of Alfalfa is the limiting factor determining the profitable life of alfalfa stands in the State. It has become the practice to plow under all stands older than 3 years. Variety tests and a breeding

program aimed at making available strains of alfalfa well adapted to the region and resistant to bacterial wilt have been conducted for a number of years at the Utah Agricultural Experiment Station. Progress has been made in this direction.

Virus Diseases of Potatoes. Growers of the State have been unable to obtain virus-free potato seed in sufficient quantities to fill their needs. The Station has inaugurated a project this year providing for the cooperation of the Department of Botany and Plant Pathology with other departments and agencies to provide for the establishment of virus-free stocks by tuber indexing, tuber-unit roguing, and supervision of the increasing of the foundation stock in isolated fields.

Potato Wilt has been a serious and recurrent source of loss to potato growers in the State. No research is being conducted at present on this problem at the Utah Station. A great amount of work done at other stations has clarified certain phases of the problem but progress toward development of satisfactory control measures has been discouraging. Further basic studies are needed, especially in the direction of determining the pathogens involved in several areas of the country, the effect of soil amendments and cultural practices, and possibly a breeding program to develop resistant varieties. The regional nature of the problem argues for a coordinated series of studies at the various stations concerned and for Federal support.

Tomato Diseases. Three diseases have constituted the major pathological threat to commercial tomato production in Utah. Bacterial Canker has been reduced by the development and application of a satisfactory control program until at present it causes serious losses only in isolated plantings where the necessary precautions are not observed. Curly-top and Verticillium wilt individually and together continue to exact serious losses every year. The Utah Station, in cooperation with the Bureau of Plant Industry, has supported an extensive research program aimed at development of resistant varieties to substitute for those now being grown. With respect to Verticillium wilt, progress has been such that the desired strain should be perfected in the near future. Development of strains resistant to Curly-top has been slower but results encourage the belief that the attempt will be successful eventually.

Virus and Similar Diseases of Stone Fruits. A total of 9 virus and bud-propagated non-virus diseases are now known to be present in Utah. As a group they constitute a threat to the industry which, if ignored, might result in its serious crippling in the very near future. Studies at the Utah Station and in several Western States indicate that immediate action should be taken to halt the spread of these diseases. What is particularly needed, in the opinion of Dr. Richards, is the establishment of a source of disease-free bud wood, scions and rootstocks. It seems evident that the States involved must act either individually or in cooperation, to secure this end at the very earliest moment possible.

Western "X" Disease of Peaches has become so well established in the northern counties of the State that eradication would involve the removal of approximately 30% of the bearing trees. It is far from certain that this drastic action would eliminate the disease. In Utah County, on the other hand, only 1.4% of the trees are infected according to data obtained in connection with the survey conducted there this season. Their removal could be undertaken with relatively little sacrifice considering the benefit that would be obtained should this result in the elimination of the disease from the County.

Root Rots of Sugar Beets of widely different nature have been a continuous source of loss over a number of years. Excepting for Dry-rot Canker (Pellicularia filamentosa) (Corticium vagum), the causes are unknown. This problem needs attention in order to clarify the nature of the causal organisms involved and to determine the effect of environmental factors and cultural practices on the development of the disease.

Powdery Mildew of Cantaloupes has been serious in the Green River area in Southeastern Utah for a number of years. It has occurred in a number of instances in the Northern Counties and might develop to serious proportions there in the future. No studies on this disease are being conducted in connection with this problem at present.

Diseases of Vegetable Seed Crops. Considerable expansion in the acreage devoted to production of vegetable seeds is expected in the near future. In cooperation with the Bureau of Plant Industry, the Station is conducting studies on the growing of these crops. The project is so young that the pathological problems which might develop have not yet clearly appeared.

#### VEGETABLE CROPS

##### Diseases of truck crops observed in Utah in 1943

Crop	Sample		Disease	% of plants affected	Estimated loss (%)
	Fields	Acres			
Onion	9	29.75	Fusarium bulb rot	0.17	0.17
Celery	2	2.5	No disease found		
Asparagus	1	0.5	No disease found		
Beet	1	1	Leaf spot	100.	Insignificant
Cabbage	12	17.25	Mosaic	.01	"
Turnip	2	0.75	Powdery mildew	66.7	"
Pepper	1	0.1	No disease found		
Watermelon	2	0.55	No disease found		
Muskmelon	6	9.6	Fusarium wilt	0.15	0.1
Cucumber	3	1.25	Mosaic	0.8	Insignificant
Carrot	9	11.35	Late blight	8.5	"
Snap Beans	15	23.25	Mosaic	15.9	3.7
Snap Beans	15	23.25	Halo blight	34.4	11.5
Snap Beans	15	23.25	Foot rot	6.5	4.5
Dry Beans	3	16.	Mosaic	63.87	15.97
Dry Beans	3	16.	Halo blight	13.75	4.5
Dry Beans	3	16.	Foot rot	0.75	0.75
Lima Beans	3	6.	No disease found		
Egg Plant	1	0.1	No disease found		
Sweet Corn	4	2.	Common Smut	5.93	5.93

ALLIUM CEPA, ONION (9 plantings). Fusarium spp. (Fusarium Bulb Rot). In a single field near American Fork, 5% of the mature bulbs showed the root system entirely rotted away and the rot extending into the bases of the scales.

APIUM GRAVEOLENS, CELERY (3 plantings). No disease was found.

ASPARAGUS OFFICINALIS, ASPARAGUS (1 planting). One planting in Davis County was free from disease. Volunteer plants in the fence rows in



Washington County were also free from disease.

BRASSICA OLERACEA var. CAPITATA, CABBAGE (12 plantings). Virus (Mosaic) Cabbage plantings were entirely free from disease excepting for one in Utah County where a trace of mosaic was observed.

BRASSICA RAPA, TURNIP (2 plantings). Erysiphe poligoni (Powdery Mildew) Two plantings in Boxelder and Cache Counties were affected with powdery mildew. The foliage was 50% and 100% covered.

CAPSICUM FRUTESCENS, PEPPER (1 planting). This planting was free from disease.

CITRULLUS VULGARIS, WATERMELON (2 plantings). These plantings were free from disease.

CUCUMIS MELO, MUSKMELON (6 plantings). Erysiphe cichoracearum (Powdery Mildew), was not observed in 1943. However, it has been very destructive in the Green River district in the past few years, according to Dr. Richards, and has been found in Davis, Weber and Boxelder Counties more recently.

Fusarium oxysporum f. melonis (F. bulbigenum var. niveum f. 2.) (Fusarium wilt) was observed in two fields in Weber County affecting 0.5% and 1% of the vines. Four other fields in Boxelder, Davis, and Washington Counties were free from disease.

CUCUMIS SATIVUS, CUCUMBER (3 plantings). Virus (Mosaic). One planting of cucumber in Weber County showed 4% of the vines affected with mosaic. Two other plantings in Boxelder and Davis Counties were free from disease.

DAUCUS CAROTA, CARROT (9 plantings). Cercospora carotae (C. apii var. carotae) (Late blight). A total of 9 carrot plantings were visited in six counties. Late blight was found in amounts varying from a trace in Weber County to 30% of the plants heavily spotted and 1% nearly defoliated in one field in Utah County. No disease was found in the single carrot planting visited in Sevier County.

LYCOPERSICON ESCULENTUM, TOMATO. Dr. Blood and Mr. Roy Christiansen have made a survey of tomato diseases in Utah over a period of eight years. Their observations will be published in detail in the Plant Disease Reporter at an early date. Only a few fields of tomatoes were visited in the course of the general survey because this special survey was being made.

Erwinia carotovora (Soft Rot). Dr. Blood reports that bacterial soft rot caused heavy losses in about 25 acres in Davis County and slight loss in a great many, probably 10%, of the fields in the State.

Corynebacterium michiganense (Bacterial Canker) was one of the most destructive of tomato diseases a few years ago, and although a satisfactory control program for it is available, it continues to cause a certain amount of loss. On a trip into Weber County with Mr. Christiansen, several fields were seen where a high percentage of the plants were affected. In one field approximately 45% of the plants were severely affected. Dr. Blood states that a number of fields in Cache County were also badly damaged by this disease.

Non-parasitic (Blossom-end Rot). Dr. Blood states that this is frequently the source of considerable loss where irrigation has not been handled properly.

Verticillium albo-atrum (Verticillium Wilt) is possibly the most damaging of the tomato diseases in the State. The disease is widely distributed in the soils of the State and at present no control measures are available.

Phytophthora parasitica (Buckeye Rot). Dr. Blood reports observing this disease occasionally.

Virus (Curly Top). Curly top is a major hazard for commercial tomato production in Utah. In the Virgin River Valley in Southern Utah it is the limiting factor preventing tomato growing on a commercial scale. In Dr. Blood's tomato breeding plots near Hurricane, Washington County, commercial varieties planted as controls were 100% affected. This season, however, it was much less prevalent than usual in the Northern Counties.

Virus (Mosaic). This disease was observed in six plantings, ranging from a trace to 50% of the plants in one field in Cache County. In another field a single plant was found exhibiting the symptoms of the yellow form of mosaic.

PHASEOLUS VULGARIS, COMMON BEAN (18 plantings). Xanthomonas phaseoli (Bacterial Blight). One field in Boxelder County was found in which 1% of the plants were spotted with bacterial blight on leaves and pods.

Pseudomonas medicaginis var. phaseolicola (Halo Blight). In two fields of snap beans in Utah County halo blight was found affecting 100% of the plants, destroying 20% of the foliage and spotting 100% of the pods remaining on the plants. The leaf lesions ranged from 0.5 - 1 mm in diameter and were surrounded by a chlorotic halo measuring from 0.5 - 1.5 cm in diameter. In a third field in the same County, dry beans (Pinkeye variety) were affected with Halo blight. Nearly all of the plants were affected and practically all of the foliage had been destroyed. A few stray plants of the Great Northern variety were not affected at all. Bacterial blight of beans in epiphytotic intensity is considered very unusual in Utah. In this case it may be associated with a series of heavy thunder showers occurring in Utah County beginning about the middle of July. Growers obtained only three pickings, where six is the usual number. Halo blight was also observed in Davis County where a few plants in one field bore a few lesions on the older leaves.

Fusarium solani f. phaseoli (F. solani var. martii f. 3) (Dry Root Rot). Dry root rot of snap beans were observed in Davis County in a single field, where 2% of the plants had been destroyed and 75% of the plants were stunted with several of the lowest leaves either dead or chlorotic. In a field of dry beans in Utah County 30% of the plants were affected with the same disease.

Virus (Mosaic). Mosaic was observed in 13 out of 17 plantings in five Counties. In Utah County 3 plantings were visited but mosaic was not observed, probably because most of the foliage had been destroyed by halo blight. It was most prevalent in Boxelder County where in one field 95% of the plants were affected. In Cache County yellow mosaic occurred in addition to the common mosaic.

PHASEOLUS LUNATUS, LIMA BEAN (3 plantings). Fusarium solani f. phaseoli (F. solani var. martii f. 3.) (Dry Root Rot). Three fields of lima beans were visited in Utah County. No disease was observed in these fields. However, a number of plants from the same County were received by Dr. Blood which were affected by a dry rot of the roots and hypocotyls. The entire root and lower stem of the affected plants were dead, dry and pithy, and a reddish-grey in color. The County Agent stated that the disease was widespread in the County and causing serious damage.

SOLANUM MELONGENA, EGGPLANT. Verticillium albo-atrum (Verticillium Wilt). Only one planting was inspected carefully, and this was free from disease. Dr. Blood states, however, that Verticillium Wilt is frequently the cause of great damage to this plant, making large scale plantings impractical.

SOLANUM TUBEROSUM, POTATO (136 plantings). Actinomyces scabies (Common Scab). Much less common scab was observed in the State than normally. Tubers being graded for shipment in Cache County ran about 2% scabby with about 0.5% more than 3/4 covered with lesions. Two storage cellars were visited in Weber and Davis Counties. Bliss Triumph and Irish Cobbler varieties in these cellars showed about 1% of the tubers with one or two lesions. Russets were generally free from scab. According to Mr. A. L. Christiansen, County Agent, this disease has caused serious losses in the past, but since then the areas where most of the disease was encountered are avoided when potatoes are planted.

(Corticium vagum). See Pellicularia filamentosa.

Corynebacterium sepedonicum (Bacterial Ring Rot). According to Mr. L. Wynn, this disease was the cause of great losses two years ago in Cache, Boxelder, and Davis Counties. Last year the disease was greatly decreased in amount, and this year it caused losses only in localized areas. He considered it of minor importance this season. This improvement may be associated with efforts to eliminate the disease from seed stocks, especially certain stocks produced locally. Approximately 100 acres of potatoes in the three counties mentioned were found to contain bacterial ring rot, ranging in amount from traces to approximately 7% in the worst case.

Erwinia phytophthora (Black Leg) was observed in 2 fields in Boxelder and Piute Counties, affecting 2% and 0.6% of the plants.

Fusarium spp. and Verticillium albo-atrum (Wilt). Wilt caused widespread and serious damage to the potato crop this year. It was present in all nine Counties where potato plantings were visited, and in 74% of the fields inspected. The relative importance of the several pathogens involved is difficult to determine because of the close similarity of the symptoms which they induce. The fact that vascular discoloration was limited to the lower stem and did not extend far above the soil line might be interpreted to indicate that Fusarium oxysporum was the predominant pathogen. In one field in Salt Lake County the plants were affected differently. The vascular discoloration extended into the tops of the plants and also into the pith of the stems at numerous points. This situation suggests that the pathogen in this case was Fusarium solani f. eumartii (F. eumartii).

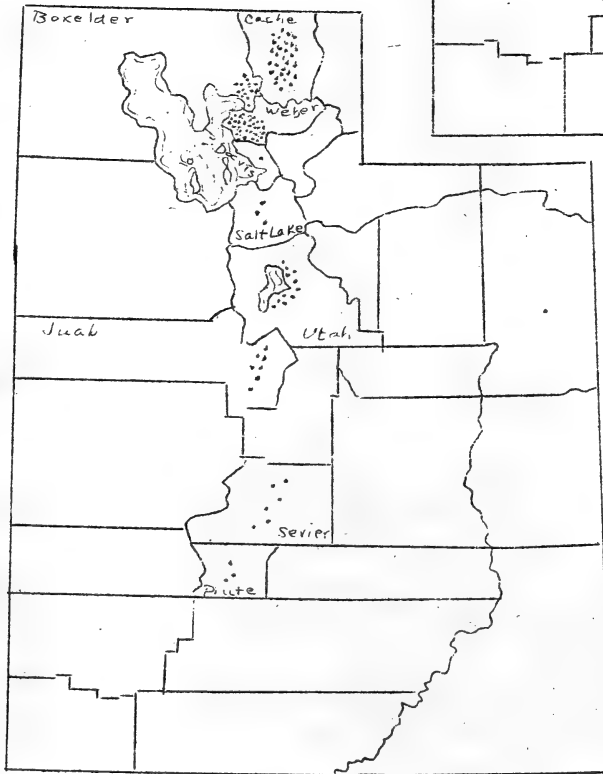
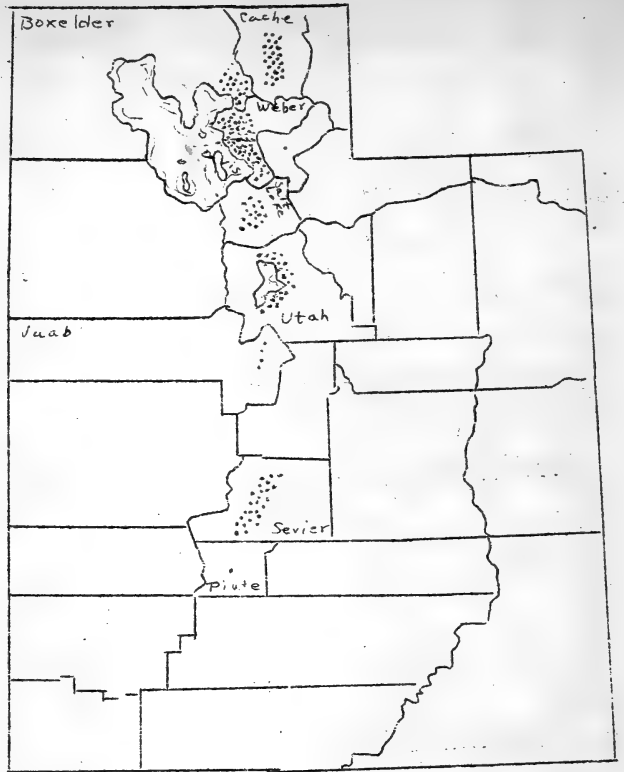
Pellicularia filamentosa (Corticium vagum) (Rhizoctonia Disease). The stem canker phase of the disease was not observed in Utah. The presence of so much wilt tended to make the detection of this disease improbable even where it occurred. Tubers inspected in Cache, Weber, and Davis Counties, indicate that about 1% of the tubers bear a light covering of very small sclerotia, not enough to affect the grade.

Virus (Leaf Roll). Leaf-roll was not found in the three Northernmost Counties of the State, and in Davis County, only a trace was discovered. In the central and Southern Counties the percentage of affected plants ranged from 2.35% to 5.71%.

Virus (Mosaic). Mosaic was generally present in Utah, being found in all nine Counties in which potato fields were inspected, excepting Davis County. It was, no doubt, present there also, but was not detected because of the obscuring effect of wilt symptoms. It was most prevalent in the Northern

Distribution of  
potato wilt in  
Utah, 1943.

Each dot  
= 0.1%



Distribution of  
potato virus  
diseases in  
Utah, 1943

Each dot  
= 0.1%

Counties, with the greatest intensity in Weber County where 35.59% of the plants were affected. The greater portion of the mosaic was of the rugose type. Numerous cases of calico were observed in Utah County, and mild mosaic was present in Sevier and Piute Counties.

Non-parasitic (Psyllid Yellows). Psyllid yellows was found in traces in Cache County, and in one field in Boxelder County where 75% of the plants were affected.

Potato diseases observed in Utah during 1943.

County	No. of fields	Acres	Percentage of plants affected				
			Wilt	Mosaic	Leaf roll	Psyllid yellows	Black leg
Cache	14	37	26.60	28.80		0.09	
Boxelder	6	45	18.89	13.89		8.33	2.00
Weber	12	32	35.59	35.59			
Davis	7	33	30.36		0.62		
Salt Lake	17	34	16.53	0.50	2.37		
Utah	54	93	22.78	6.58	4.70		
Juab	5	19	3.61	2.76	4.05		
Sevier	11	73	26.20	0.08	5.71		
Piute	10	66	0.72	0.31	2.26		0.61
Totals	136	432	20.10	8.03	1.89	0.87	0.30
Estimated loss (%)			5.26	2.40	0.60	0.25	0.10

CEREALS

AVENA SATIVA, OATS (4 plantings). Puccinia graminis (Stem Rust). Four plantings of oats, all in Cache County, were visited. Three were free from disease and the fourth contained a trace of stem rust.

HORDEUM VULGARE, BARLEY (1 planting). Erysiphe graminis (Powdery Mildew) was found affecting all but the uppermost leaves of 100% of the plants in a mixed planting with oats. The oats were not affected.

Puccinia graminis (stem rust). A trace of stem rust was also found in the field mentioned above.

Typhula spp. (Snow Rot), was not observed in 1943. Dr. Richards reports a serious outbreak of this disease in 1941 which resulted in the destruction of from 75% to 90% of the barley plantings.

MEDICAGO SATIVA, ALFALFA (21 plantings). Corynebacterium insidiosum (Bacterial Wilt) was observed in three plantings in Cache, Washington, and Sevier Counties, affecting from 1% to 4% of the plants. Dr. Richards states that bacterial wilt of alfalfa is widespread in the State and limits the profitable age of alfalfa plantings to about three years.

Cuscuta sp. (Dodder) was observed parasitizing alfalfa in two fields in Cache County and two in Washington County, affecting from a trace to 2.5% of the plants.

Peronospora trifoliorum (Downy Mildew) was found in one field in Cache County, affecting the youngest leaves of an occasional plant.

Pseudopeziza medicaginis (Leaf Spot). Some leaves of plants in 14 plantings in five different Counties were spotted. Usually only the lowest few leaves were spotted, but in one field in Washington County 75% of the foliage of all of the plants were spotted.

Pyrenopeziza medicaginis (Yellow Leaf Blotch) was seen in five fields in Cache and Boxelder Counties. In four of the fields only a trace was present. In the fifth 50% of the foliage of all of the plants was spotted.

Virus (Mosaic). Mosaic was found in four fields in Cache and Washington Counties. In two fields it was present only in traces. In the other fields 1% and 50% of the plants were affected.

#### Alfalfa diseases observed in Utah in 1943

County	No. of fields	Acres	Percentage of plants affected					
			Bact. wilt	Dodder	Downy mildew	Leaf spot	Leaf blotch	Mosaic
Cache	10	114.5	0.17	0.14	.001	20.1	.04	.05
Boxelder	3	25				.06	.06	
Weber	1	5	1.0			100.		
Washington	6	43	.54	.12		87.2		6.1
Sevier	1	20	4.0			100.		
Totals	21	207.5	0.62	.10	trace	41.21	.03	1.28

SORGHUM VULGARE, SORGHUM. Sphacelotheca sorghi (Covered-kernel Smut). A trace of this disease was observed in a five-acre planting in Washington County.

TRITICUM AESTIVUM, WHEAT. Erysiphe graminis (Powdery Mildew) was observed in a single planting in Cache County. A narrow strip along one side of the field, adjacent to a barley planting, was heavily covered. The barley was also affected with powdery mildew.

Puccinia graminis (Stem Rust). Mr. A. F. Bracken reports that only traces of stem rust occurred in the State this year.

Tilletia caries (T. tritici) and T. foetida (T. levis) (Covered Smut, Bunt). Mr. A. F. Bracken reports traces of both tall and short bunt this year. He associates the decrease in amount of bunt with late planting last fall, which allowed most of the plants to escape infection, and also with the increased use of bunt-resistant varieties developed at the Utah Station.

Typhula spp. (Snow Rot) was not observed in 1943. Dr. Richards reports a serious outbreak in 1941 which destroyed from 25% to 30% of the winter wheat that season.

ZEA MAYS, CORN (5 plantings). Ustilago maydis (U. zeae) (Common Smut) Five plantings of field corn were visited. In one field in Weber County 0.5% of the ears were smutted. In two plantings of sweet corn in Davis County a trace and 7% of the ears were smutted, and in two others in Washington County 3% and 30% of the ears were smutted.



## FRUIT AND NUT CROPS

AMYGDALUS COMMUNIS, ALMOND (1 planting). Coryneum carpophilum (C. beijerinckii) (Shot-Hole Disease). A small planting in Washington County showed a light spotting of leaves on the lower branches. Nearby, peach trees were clean.

AMYGDALUS PERSICA, PEACH (53 plantings). Coryneum carpophilum (C. beijerinckii) (Shot-Hole Disease), was not common on peaches this year. It was observed in only one planting in Utah County, where it has defoliated the centers of a young orchard.

Non-parasitic (Iron Chlorosis). Chlorosis of peach trees due to iron deficiency was observed in all of the areas visited. It varied greatly within small areas, ranging from a trace at the ends of the shoots to nearly 100% of the foliage of whole plantings.

Non-parasitic (Sun Scald). In one orchard in Washington County 95% of the trees bore numerous cankers, ranging from 6 to 18 inches in length and from 1 to 3 inches in width, along the upper sides of the main branches. These trees had been pruned to a very open habit.

Virus (Mosaic) Dr. Richards states that this disease is still present in considerable amounts in Grand and San Juan Counties despite the fact that eradication has been carried on there for a number of years. One of the difficulties encountered has been the presence of the virus in symptomless carriers such as the apricot and Pottawatomie plums.

Virus (Western "X" Disease). This disease received special attention because information was needed on which to base recommendations for a control program. Western "X" Disease of peaches was first observed in the State by Dr. Richards in 1939. According to data collected by him, the percentage of trees affected in 9 orchards near Bountiful, Davis County, had increased from 22.4% in 1939 to 41.5% in 1943. The data for Davis County as a whole indicates somewhat lower concentration of the disease for 1943. On the other hand one orchard was surveyed in which 78% of the trees were found to be affected. The percentages for Boxelder and Davis Counties for 1943 were 22 and 29 respectively. Utah County, which is an important peach growing county, showed only 1.4% of the trees affected.

FRAGARIA, STRAWBERRY (1 planting). Mycosphaerella fragariae (Leaf Spot) A trace of leaf spot was observed in a 2-acre planting in Washington County.

MALUS SYLVESTRIS, APPLE (11 plantings). Erwinia amylovora (Fireblight) on apples was observed in Boxelder, Utah and Sevier Counties. In Boxelder County 2% of the trees were affected with 10% of the fruiting spurs killed. In Utah County it was observed on a single tree, killing about 50% of the fruiting spurs. In Sevier County 50% of the trees in an orchard were affected with 25% of the fruiting spurs killed.

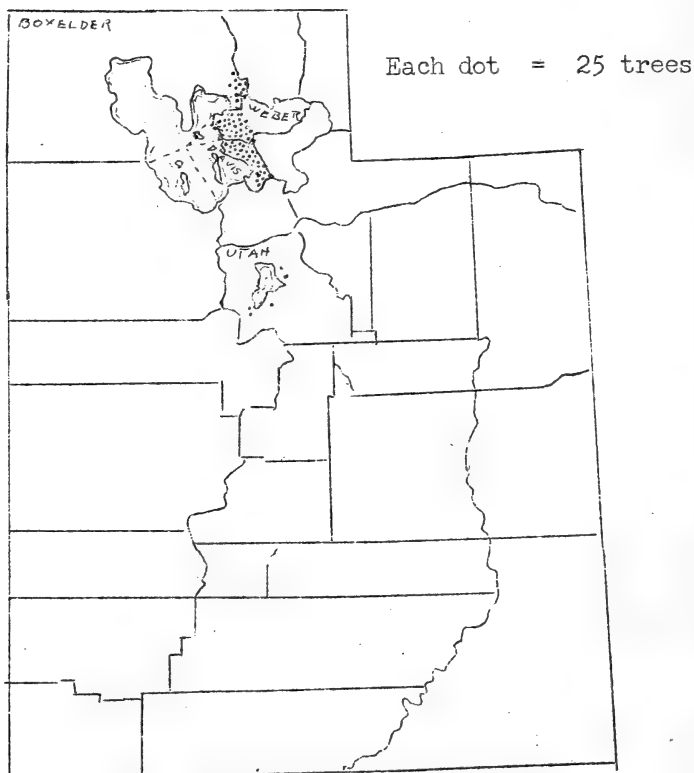
Undetermined (Root Rot). A single tree in Utah County was found which was nearly dead as the result of a root rot of undetermined cause.

Non-parasitic (Iron Chlorosis). Iron deficiency symptoms were observed on apples in Cache, Utah, Juab, Sanpete, Sevier, and Washington Counties. It was especially severe in Sanpete County in the vicinity of Gunnison.

PRUNUS ABELENICA, APRICOT. Coryneum carpophilum (C. beijerinckii) (Shot Hole Disease)? Shot hole disease symptoms were observed almost universally on the leaves in apricot orchards, but fruit and twig lesions were not found.

## Distribution of Western "X" Disease in peach orchards of Utah, 1943.

County	No. of orchards	No. of trees	% of trees affected	Estimated Loss (%)
Boxelder	4	1,317	22.0	22.0
Davis	14	2,711	29.1	29.1
Utah	32	10,051	1.4	1.4
Washington	3	179	0.0	0.0

Distribution of Western "X" Disease  
1943

Undetermined (Dieback). Dieback of twigs and branches is common, especially in neglected orchards. Several factors are very probably involved, including winter injury, wood decay fungi, and Verticillium albo-atrum. In one orchard in Boxelder County 3% of the trees had from 1% to 50% of their limbs killed back to the main trunk.

PRUNUS AVIUM, SWEET CHERRY (5 plantings). Podosphaera leucotricha (Powdery Mildew). Several trees in one orchard in Davis County were affected with powdery mildew which appeared as a mottling of the leaves on low, shaded limbs.

Non-parasitic (Iron Chlorosis). Chlorosis was observed in one planting in Washington County affecting the leaves at the tips of the shoots in 25% of the trees. The affected trees were planted near the irrigation ditch where the soil may have been waterlogged periodically.

Undetermined (Crinkle). This disease has become widely distributed in the State, very probably by means of diseased nursery stock or bud wood. In Washington County a nursery planting of approximately 400 trees was found to contain crinkle in 4.5% of the trees. Dr. Richards reports 17% of the trees affected in six orchards in this County and similar percentages in Boxelder County from an earlier survey.

Undetermined (Deep Suture Disease). Dr. Richards reports this disease in four orchards in Utah. He believes it to be generally distributed throughout the State.

Undetermined (Dieback). In one orchard in Boxelder County 90% of the trees were killed back 50% and approximately 10% of the trees had been removed. Occasional trees exhibiting dieback can be found in nearly every orchard. The etiology is not understood, but it seems evident that a number of factors are involved, including winter injury and virus diseases. In a planting along an irrigation ditch in Washington County dieback was apparently associated with root drowning.

Undetermined (Wilting Disease,). The trees go down suddenly as though the main trunk had been girdled. No information was obtained this season on the distribution or intensity of this disturbance because of the presence of autumnal coloring and normal seasonal maturing. It is believed, however, that it is quite common in the Northern Counties on the basis of previous observations made by Dr. Richards. Dr. Richards has experimental evidence indicating that the trouble may be of virus origin.

Virus (Rasp-leaf). Rasp-leaf has been found by Dr. Richards in four orchards in Davis County. It was observed this season in artificially inoculated trees in his experimental plots, the diseased bud wood used in the inoculation coming from the orchards mentioned.

Virus (Ring Spot or Lace leaf of Sweet Cherry). Dr. Richards reports this disease distributed generally throughout the State.

Virus (Rusty Mottle?). Leaf and twig symptoms resembling rusty mottle of sweet cherries were observed in three plantings in the vicinity of Bountiful, Davis County. Final diagnosis of this trouble must await the time when early season symptoms and fruit symptoms may be checked. Approximately 60% of the trees were dead or dying from this disease in one orchard, while in another approximately 10% of the trees were badly affected. It was also observed in a single tree in a third orchard. There seems to be a fairly definite indication that the disease was introduced, in the first two orchards at least, through budding of diseased pollinator buds into the affected trees.

PRUNUS CERASUS, SOUR CHERRY (4 plantings). Undetermined (Dieback). Dieback is generally present and frequently causes considerable loss in individual orchards. A number of factors are involved, including winter injury and possibly virus disease (see above under sweet cherry).

Undetermined (Wilting Disease). Occasional trees wilt suddenly as though the main trunk were girdled. This disturbance is widespread in the Northern Counties and over a period of years has undoubtedly caused serious losses. Dr. Richards has experimental evidence to indicate that a virus is involved.

PRUNUS DOMESTICA, PLUM, PRUNE. Non-parasitic (Iron Chlorosis). Iron deficiency symptoms were observed in a small planting of plums in Washington County. The leaves at the tips of the shoots in 87.5% of the trees were affected.

Undetermined (leaf Spot or Mottle of Italian Prunes). This disturbance appears as a necrotic spot on the leaves, resulting in shot-hole effects and defoliation. Dr. Richards reports it widespread in the State becoming a limiting factor in the production of this crop. He states that this is one of the most destructive stone-fruit diseases in the State. Entire plantings are pulled out each year because of it.

PYRUS COMMUNIS, PEAR (3 plantings). Non-parasitic (Iron Chlorosis). Iron deficiency symptoms were observed on pear trees in Utah and Washington Counties. In one planting in Washington County 3.6% of the trees were chlorotic in 75% to 100% of the foliage.

RUBUS spp., RASPBERRY (7 plantings). Non-parasitic (Iron Chlorosis). Iron deficiency symptoms were observed in five plantings in Cache, Boxelder, and Juab Counties. In most cases only the leaves at the tips of the shoots were chlorotic and the percentage of affected canes ranged from 50 to 100.

Virus (Mosaic). In one planting in Hyrum, Cache County, 100% of the canes were affected. The mottling on the older leaves was faint. There was a tendency for the leaves to become cupped downward. There was some puckering of the leaf blades, and necrotic spots occurred in the extremely chlorotic areas. The planting was uniformly affected, indicating that the propagation was from diseased stock. Many dried fruits remained attached to the canes long after harvest was completed. The estimated loss was 50%.

VITIS spp., GRAPE. Non-parasitic (Iron Chlorosis). The two plantings visited were planted to vinifera varieties of grapes and no iron deficiency symptoms were observed in them. Dr. Wann states that the Concord variety is frequently and seriously affected when grown on its own roots.

#### SPECIAL CROPS

BETA VULGARIS, BEET (15 plantings). Cercospora beticola (Leaf Spot) was generally present on garden beets in the State, but not abundant or causing appreciable damage. In a one-acre planting near Millard, Boxelder County, 100% of the plants were lightly spotted.

Phytophthora sp. (Wet Root Rot), was observed in one field of sugar beets in Cache County, affecting 25% of the plants in the field. The soil was very heavy and the affected plants were in areas where the soil had been flooded at some time previous to the appearance of the disease.

Undetermined (Damping-off). In one field of sugar beets seedlings (seed crop) in Washington County 10% of the plants were missing in low, wet areas in the field, or about 2.5% of the whole planting was destroyed. Stunted seedlings bore black root lesions.

Undetermined (Crown Rot). A dark brown, firm, moist crown rot was observed affecting a few sugar beet plants in 2 different fields in Boxelder and Cache Counties.

Virus (Curly Top). The practice of planting curly-top-resistant strains of sugar beet has practically eliminated this disease as a major threat to the crop in Utah. It was observed in one field in Boxelder County where it affected 7% of the plants, in another field in Washington County where it affected a single seedling, and also in Dr. Blood's tomato breeding plots in Cache and Washington Counties where a curly-top-susceptible strain was planted, and nearly 100% of the plants were affected.

Virus (Mosaic). This disease was observed on a single sugar beet plant in Dr. Blood's tomato breeding plot in Washington County.

#### Sugar beet diseases observed in Utah during 1943

County	No. of fields	Acres	Percentage of plants affected				
			Wet root rot	Damping-off	Crown rot	Curly top	Mosaic
Cache	6	20.25	0.3		.01	trace	
Boxelder	2	17.00			2.9		
Weber	1	5.00					
Utah	1	8.00					
Washington	5	16.00		0.8		trace	0.03
Totals	15	66.25	.09	0.19	0.9	trace	.007

#### OBSERVATIONS ON PLANT DISEASES IN NEVADA DURING 1943

Seth Barton Locke

#### Collaborators

#### University of Nevada Agricultural Experiment Station

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Dr. Oliver Smith

#### Nevada State Department of Agriculture

Mr. Schweis

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#### Major Pathological Problems

Bacterial Wilt of Alfalfa. This disease is the limiting factor that determines the profitable life of alfalfa stands in the State. The Nevada Experiment Station in cooperation with the Bureau of Plant Industry is con-

ducting variety tests at several points within the State in order to select strains which are well adapted to the area and also resistant to bacterial wilt.

Potato Virus Diseases. The problem of obtaining sufficient virus-free potato seed is a serious one. The State Department of Agriculture is directing part of its effort toward increasing the amount of certified seed grown within the State.

Potato Wilt. Potato wilt is a major pathological problem in Nevada. Effective control measures for this disease are badly needed.

#### LIST OF DISEASES REPORTED

ALLIUM CEPA, ONION. Two plantings were visited in Washoe County. No disease was found.

Botrytis spp. (Neck Rot). An occasional bulb was affected with Botrytis neck rot in a single storage place visited near Reno.

APIUM GRAVEOLENS, CELERY (1 planting). Virus (Mosaic). In a planting in Washoe County 2% of the plants were affected with a mosaic. Mottling and puckering of the leaf blade were the only symptoms observed.

BETA VULGARIS, BEET, CHARD (3 plantings). Cercospora beticola (Leaf Blight). In all table beet plantings visited the leaves were lightly spotted. Chard was free from this disease.

BRASSICA OLERACEA var. CAPITATA, CABBAGE (2 plantings). No disease was found on cabbage.

BRASSICA RAPA, TURNIP (2 plantings). Erysiphe polygoni (Powdery Mildew) Powdery mildew was found affecting 90% of the plants in one field in Pershing County.

Undetermined (Crown Rot). A wet crown rot of turnips was observed in one field in Washoe County affecting an occasional plant.

CICHORIUM ENDIVIA, ENDIVE. A single planting in Washoe County was found to be free from disease.

CUCURBITA MAXIMA, SQUASH. One planting near Lovelock, Pershing County, was found to be free from disease.

DAUCUS CAROTA, CARROT (2 plantings). Two plantings in Washoe County were free from disease.

MEDICAGO SATIVA, ALFALFA (5 plantings). Corynebacterium insidiosum (Bacterial Wilt). According to Dr. Smith, bacterial wilt is generally present wherever alfalfa is grown and limits the profitable life of the stands to about three years. This disease was seen in one field in Lyon County where it affected 3% of the plants, and also in two of Dr. Smith's test plantings.

Peronospora trifoliorum (Downy Mildew), was seen producing leaf spots on 5% and 50% of the plants in two plantings in Washoe County.

Pseudopeziza medicaginis (Leaf Spot) was present in traces in two fields in Washoe and Pershing Counties.

TRIFOLIUM PRATENSE, RED CLOVER (2 plantings). Erysiphe polygoni (Powdery Mildew) was present on practically all red clover seen. In two fields in Washoe County 100% of the foliage was affected.

Virus (Mosaic). Traces of mosaic were observed in one field in Washoe County.



SOLANUM TUBEROSUM, POTATO (25 plantings). Actinomyces scabies (Common Scab) was observed during the growing season only in traces in a single planting in Washoe County. Traces were also observed in one storage cellar near Reno. Mr. Shogren states that there has been very little of this disease in Nevada this year.

Fusarium spp. and Verticillium albo-atrum (Wilt). Wilt was found in all of the 5 counties visited in western Nevada, and in 80% of the fields visited. Washoe and Churchill Counties were the worst affected, having approximately 29% of the plants affected, and in some cases 100%.

Rhizoctonia solani (Rhizoctonia Disease). Rhizoctonia stem cankers were found on plantings in 3 counties in Western Nevada, but only in traces excepting in Washoe County where 100% of the plants were affected in some fields. Approximately 23% of all of the plants examined in the county were affected. Perhaps the amount was even greater because it was difficult to identify when wilt was present. Very little Black Scurf was observed on stored tubers in November.

Virus (Leaf Roll). Leaf roll was more abundant in Western Nevada than in Utah. Approximately 8% of the plants were affected, and the percentage ran as high as 12% in Pershing County near Lovelock. A single planting in Douglas County showed 25% of the plants affected with leaf roll.

Virus (Mosaic). Mosaic was much less prevalent in western Nevada than in Utah. In none of the 5 counties visited did the percentage exceed 0.25%.

#### Distribution of potato diseases in Western Nevada, 1943

County	Sample		Percentage of plants affected				
	Fields	Acres	Wilt	Rhizoc- tonia	Scab	Leaf roll	Mosaic
Washoe	12	52.0	28.9	23.3	0.01	0.1	0.07
Douglas	1	15.1	1.0	0.0	0.00	25.0	0.00
Churchill	3	15.5	29.2	0.0	0.00	1.6	0.07
Lyon	6	16.5	7.63	0.1	0.00	5.5	0.09
Pershing	3	100.0	0.78	0.1	0.00	12.25	0.25
Totals and average	25	199.0	12.48	6.16	----	8.65	0.15
Estimated loss (%)			2.25	1.85	----	2.60	0.06

TRITICUM AESTIVUM, WHEAT. Puccinia graminis (Stem Rust) and Tilletia caries (*T. tritici*) and T. foetida (*T. levis*) (Covered Smut, Bunt). Mr. Shogren states that only traces of these diseases were present this year.

#### SUMMARY OF PLANT DISEASES OBSERVED IN CALIFORNIA IN 1943

Horace L. Barnett

The following report of observations of plant diseases in California was prepared with the cooperation of all of the Plant Pathologists of the University of California and the State Department of Agriculture. A few other qualified persons have contributed several reports. Particular emphasis has been placed upon the diseases of food-producing plants. No special

effort was made to obtain or record observations of the diseases on the so-called ornamental plants. It is not intended that this report necessarily give a complete list of the plant diseases observed on these hosts during the year 1943.

#### VEGETABLE CROPS

ALLIUM CEPA, ONION. Peronospora destructor, downy mildew, was widespread and common, causing an estimated 25% reduction in yield. Botrytis sp., gray mold rot, was not serious. One report, from Yolo County, was received of Sclerotium bataticola, charcoal rot, occurring on the outer scales only. Aspergillus niger, black mold, was also observed.

Aster yellows (virus) occurred locally in Sonoma County; loss was slight. Yellow dwarf (virus) was observed in one location, San Pablo.

ALLIUM SCHOENOPRASUM, CHIVES. One report, from San Mateo County, was received of the occurrence of Peronospora destructor, downy mildew, on this host.

APIUM GRAVEOLENS, CELERY. Cercospora apii, early blight, was reported only from Southern California.

Fusarium oxysporum f. apii, Fusarium yellows, was scattered in occurrence and caused slight damage. Most growers use resistant varieties.

Heterodera marioni, rootknot, was scattered and of slight importance on celery.

Sclerotinia sclerotiorum, cottony rot, was also scattered in distribution and caused slight damage.

Septoria apii, late blight, was general in most areas. Copper sprays and dusts were very effective in controlling the disease, but infection was heavy where no control measures were used.

Aster yellows (virus) was general and caused losses as high as 15% in some fields.

Calico (virus) occurred in the Delta region. The percentage of infection was high in some fields but little damage resulted.

Spotted wilt, (virus) was scattered near the coast; damage was slight.

Western celery mosaic (virus) was general from the Salinas Valley northward. Especially heavy infection was observed in the Delta region. The disease was also reported from Southern California.

Blackheart due to improper moisture relations was scattered in occurrence and caused slight damage.

One report was received of boron deficiency, from San Francisco County.

APIUM GRAVEOLENS var. RAPACEUM, CELTRAC, CELERY ROOT. Local heavy infections by Septoria apii, late blight, were observed, but damage was not great. Aster yellows (virus) occurred locally in San Mateo County.

ASPARAGUS OFFICINALIS, ASPARAGUS. Puccinia asparagi, rust, was reported from Southern California.

BETA VULGARIS, GARDEN BEET. Infection by Cercospora beticola, leaf spot, was general but light. Peronospora schachtii, downy mildew, occurred in light infections in most fields, but heavy infection was observed in a few fields of garden beets near Colma. Uromyces betae, rust, was general and abundant in most places but doing little damage. Curly top (virus) was general, especially in the interior, but infection was less severe than usual. Boron deficiency was observed causing slight loss in San Mateo County.

BETA VULGARIS var. CICLA, CHARD. Light infection by Cercospora beticola, leaf spot, occurred locally in San Mateo County. Very light infection by Peronospora schachtii, downy mildew, was observed near the coast. Uromyces betae, rust, was causing considerable loss in a few small fields near Colma, San Mateo County. Mosaic (virus) was observed in San Mateo County.

BRASSICA CHINENSIS, CHINESE CABBAGE. Cercospora albomaculans, leaf spot, occurred locally in San Mateo County.

BRASSICA OLERACEA var. ACEPHALA, KALE. Erysiphe polygoni, powdery mildew, in local infections, Mycosphaerella brassicicola, ringspot, causing slight damage, and black ring (virus), were observed in San Mateo County.

BRASSICA OLERACEA var., BRASCETTE. Mycosphaerella brassicicola, ringspot, and Peronospora parasitica, downy mildew, were observed in San Mateo County.

BRASSICA OLERACEA var. BOTRYTIS, BROCCOLI. Mycosphaerella brassicicola, ringspot, occurred in the coastal areas; heaviest infection was seen in the Bay region. Peronospora parasitica, downy mildew, was general near the coast, but caused little or no damage in the field. Phytophthora megasperma, root rot, was observed in San Mateo County where it caused little loss. Pseudomonas (Phytomonas) maculicola, bacterial leaf spot, occurred locally in San Mateo County on young plants. Rhizoctonia solani, wirestem, and Sclerotinia sclerotiorum, drop, were reported from Southern California. Light infection by mosaic (virus) was observed in coastal areas.

BRASSICA OLERACEA var. BOTRYTIS, CAULIFLOWER. Alternaria sp., leaf spot, occurred in scattered light infections. Mycosphaerella brassicicola, ringspot, occurred in the coastal areas; it was confined mainly to the outer leaves. Peronospora parasitica, downy mildew, was general in the coastal areas. Infection was common and moderately heavy in the plant beds but little damage was done under field conditions. Phytophthora megasperma, occurred in scattered locations where the soil is excessively wet. Appreciable loss was observed in only one field. Black ring (virus) caused slight damage in coastal areas. Mosaic (virus) was general near the coast, and was the most severe disease of cauliflower in coastal regions. The percentage of infection varied in different fields, ranging up to approximately 50%.

BRASSICA OLERACEA var. CAPITATA, CABBAGE. Light scattered infection by Botrytis sp., gray mold rot, was observed on cabbage grown for seed. Cercospora sp., leaf spot, was scattered and caused no damage. Erysiphe polygoni, powdery mildew, was generally distributed but caused no damage. Mycosphaerella brassicicola, ringspot, occurred in coastal areas. Heaviest infection was observed in San Mateo County. Mostly only outer leaves were affected. Peronospora parasitica, downy mildew, was general in coastal regions, where it was abundant in plant beds but doing little or no damage in the fields. Rhizoctonia sp., root rot, occurred locally in Yolo County, on young plants. Rhizoctonia solani, stem rot, was reported from Southern California. Scattered infection by Sclerotinia sclerotiorum, cottony rot, was observed late in the season on cabbage grown for seed. Aster yellows (virus) was scattered in distribution and caused slight loss. Black ring (virus) occurred in scattered locations in the coastal areas; loss was slight.

BRASSICA OLERACEA var. GEMMIFERA, BRUSSELS SPROUTS. Light infection by Botrytis sp., gray mold rot, was observed in one seed field in Santa

Barbara County. Peronospora parasitica, downy mildew, was coastal in distribution; apparently no damage was caused in the field. One serious outbreak of Sclerotinia sclerotiorum, cottony rot, was reported in Santa Cruz County. Black ring (virus) was observed in San Mateo County; no damage resulted. Light infection by mosaic (virus) occurred in coastal areas.

BRASSICA RAPA, TURNIP. Scattered light infections by Alternaria sp., leaf spot, and Peronospora parasitica, downy mildew, were observed on this host. Mosaic (virus), was commonly found, but little damage was done.

BRASSICA sp., MUSTARD. Erysiphe polygoni, powdery mildew, occurred on this host.

CAPSICUM FRUTESCENS, PEPPER. Alternaria sp. causing fruit spot was scattered in distribution with slight loss. Phytophthora capsici, root rot, was observed in Merced County and in southern California. Rhizoctonia solani, root rot, was reported from Southern California. In one field of 50 acres near Santa Maria approximately 2% of the plants were killed or severely damaged by Sclerotinia sclerotiorum causing collar rot. Slight loss due to Verticillium albo-atrum, Verticillium wilt, was reported from Merced and Santa Barbara Counties. Occurrence of mosaic (virus) was scattered and light. The cucumber-mosaic and tobacco-mosaic viruses were reported from Southern California. Spotted wilt (virus) occurred in coastal areas; infection was heavy in some places.

CICER ARIETINUM, GARBANZO, CHICK PEA. Mosaic (virus) was observed on this host.

CICHORIUM ENDIVIA, ENDIVE. Botrytis sp., gray mold rot, was observed in the Salinas Valley. It frequently occurs on plants also infected with Sclerotinia or with aster yellows. Puccinia hieracii, rust, was observed in San Mateo County. Heavy infection with considerable loss was noted in one field, and a slight amount in some others. Sclerotinia sclerotiorum, cottony rot, occurred in the Salinas Valley; loss in one field was estimated at 10%. Aster yellows (virus) was observed in San Mateo, Monterey and Santa Barbara Counties, causing slight loss.

CICHORIUM INTYBUS, CHICORY. Spotted wilt (virus) occurred locally in the Bay region.

CITRULLUS VULGARIS, WATERMELON. Fusarium oxysporum f. niveum, Fusarium wilt, was observed in Stanislaus County.

CUCUMIS MELO, CANTALOUPE. Infection by Erysiphe cichoracearum, powdery mildew, was general and moderately heavy. Considerable loss from Fusarium sp.; Fusarium fruit rot, resulted in one field of Persian melons in Stanislaus County. Mosaic (virus) was scattered and of slight importance.

CUCUMIS SATIVUS, CUCUMBER. Erysiphe cichoracearum, powdery mildew, was general. Pseudoperonospora cubensis, downy mildew, was reported only from Southern California. Mosaic (aphid-transmitted virus) was scattered in the interior valleys; it was severe locally in Tulare County.

CUCURBITA MAXIMA, WINTER SQUASH. Erysiphe cichoracearum, powdery mildew, was general.

CUCURBITA PEPO, SUMMER SQUASH. Erysiphe cichoracearum, powdery mildew, was general. Pseudoperonospora cubensis, downy mildew, was reported only from Southern California. Mosaic due to an aphid-transmitted virus was scattered in distribution and caused slight loss. Mosaic due to a beetle-transmitted virus was observed in Santa Clara and San Mateo Counties.

CYNARA CARDUNCULUS, CARDOON. A trace of powdery mildew caused by Erysiphe sp. (probably E. cichoracearum) was observed in San Mateo County.

Ramularia sp. (probably R. cynarae), leaf spot, occurred on the older leaves only, in San Mateo County.

CYNARA SCOLYMUS, ARTICHOKE (GLOBE). Botrytis cinerea, gray mold rot, was reported from Santa Cruz County. Ramularia cynarae, leaf spot, was general in coastal areas; infection was moderately heavy locally but damage was slight.

DAUCUS CAROTA, CARROT. Cercospora carotae (C. apii var. carotae), blight, was scattered in distribution. Heavy infection occurred locally but total damage was slight.

Erwinia carotovora, bacterial soft rot, caused some damage to carrots grown for dehydration in the Salinas Valley. Infection followed growth cracks.

Heterodera marioni, rootknot, was generally distributed; damage was variable.

Alternaria carotae (Macrosporium carotae) blight, was scattered, occurring mostly in light infections.

Sclerotium rolfsii, southern root rot, occurred locally in Santa Clara County.

Xanthomonas (Phytophthora) carotae, bacterial blight, was general, especially in the Salinas Valley. The root infection phase of the disease is severe on shipping carrots.

Aster yellows (virus), occurred in the Bay region; it was not serious.

IPOMOEA BATATAS, SWEETPOTATO. Endoconidiophora (Ceratostomella) fimbriata, black rot, occurred generally wherever the crop is grown. It was serious early in the season in San Bernadino County. Damage due to rotted roots late in the season was not great.

Fusarium oxysporum f. batatas, stem rot, was the most serious disease of sweetpotatoes in the San Joaquin Valley. Infection was high in most fields observed near Atwater in Merced County. In several fields of Yellow Jerseys as high as 35% of the vines were either killed or rendered nonproductive. The planting of vine cuttings for the production of clean seed is being tried out.

Heterodera marioni, rootknot, was reported as serious in some fields in Merced County.

Monilochaetes infusans, scurf, was commonly found in the San Joaquin Valley but damage was not serious.

Phoma terrestris was isolated from small "scabby" spots on the large roots from Merced County. It is not known whether the fungus is an active parasite or not.

Pythium sp., mottle necrosis, occurred locally, near Atwater in Merced County, where a few affected sweetpotatoes were collected from several fields. Loss was negligible.

Sclerotium bataticola, charcoal rot, was found in 3 fields in Merced County. Damage was not serious.

LACTUCA SATIVA, LETTUCE. Botrytis cinerea, gray mold rot, was scattered in occurrence. It was prevalent in the Salinas Valley. The disease was often associated with Sclerotinia. The amount of damage was difficult to determine.

Bremia lactucae, downy mildew, occurred in coastal areas where infection was moderate in some fields but total damage slight.

Slight infection by Marssonina panattoniana, anthracnose, was reported from Sacramento and Los Angeles Counties.

Sclerotinia sclerotiorum, drop, was general in occurrence and especial-

ly common in the Salinas Valley. As high as 15% infection was observed in some fields.

Aster yellows (virus) was general, especially near the coast. As high as 15% infection was estimated in a few fields.

Spotted wilt (virus) occurred in coastal areas; infection was light in most places.

Big vein, cause unknown, occurred in the Salinas Valley. Moderate loss was observed in a few fields; in others it was slight.

Boron deficiency caused slight damage in San Mateo County.

LACTUCA SATIVA, var., CELTUCE. Bremia lactucae, downy mildew, was reported once, from San Francisco County.

LYCOPERSICON ESCULENTUM, TOMATO. Some early infection by Alternaria solani, early blight, occurred in the plant beds. Slight infection was seen late in the season at Colma.

Slight infection by Cladosporium fulvum, leaf mold, was noted in one greenhouse at Colma.

A severe local outbreak of Corynebacterium michiganense (Phytomonas michiganensis), bacterial canker, occurred near Livermore, where the disease was also found in the plant beds. Infection was very light in some other localities.

Cuscuta campestris, dodder, was found on 3 plants in Butte County.

Fusarium oxysporum f. lycopersici, Fusarium wilt, was scattered in distribution. As high as 20% infection was observed in one field in Contra Costa County. Infection was light in most other areas.

Heterodera marioni, rootknot, was scattered and caused moderate damage in local areas.

Heavy infection by Phytophthora infestans, late blight, was observed on fruit in a few small plots near Colma late in the season; total loss was slight.

Phytophthora parasitica, buckeye rot, was not as prevalent as usual. It was found on a few fruits wet by irrigation water in Contra Costa County.

Pseudomonas tomato (Phytomonas punctulans), bacterial speck, was observed only in plant beds in Yolo County.

Pythium sp., damping-off, was general, and severe in some cases.

Rhizoctonia solani, soil rot, was found on a few fruits in Contra Costa County.

Rhizopus nigricans causing canker and fruit rot was scattered in distribution. It was more abundant than usual and was severe in a number of fields.

Psyllid yellows induced by Paratrioza cockerelli was scattered in coastal areas. Loss was not great where the disease was observed.

One plant affected by big bud (virus) was found near Brentwood in Contra Costa County.

Curly top (virus) was scattered in distribution, occurring especially in the interior valleys, and was severe locally. In one field in Kern County 30% of the plants were killed or severely damaged.

Mosaic (virus) was general.

Spotted wilt (virus) was general near the coast with scattered light infections in the interior. Attack was worse than usual. The disease was very abundant near Irvington, Milpitas, San Jose, and Salinas. A few scattered fields were a total loss. The many ornamental hosts of the virus enable it to exist in living plants in some places throughout the year.



PASTINACA SATIVA, PARSNIP. A few plants affected by aster yellows (virus) were found at Colma, San Mateo County.

PETROSELINUM CRISPUM, PARSLEY. Aster yellows (virus) was found in both the curled-leaf and straight-leaf varieties in Monterey County, in slight amounts.

PHASEOLUS LUNATUS, LIMA BEAN. Rhizoctonia solani causing root rot occurred locally on seedlings; damage was slight.

PHASEOLUS VULGARIS, BEAN. Erysiphe polygoni, powdery mildew, was general but caused slight damage. Fusarium solani f. phaseoli, dry root rot, occurred generally. It was prevalent in the coastal areas and caused loss in some cases. Heterodera marioni, rootknot, was scattered in distribution, in the southern part of the State. Pythium sp., Pythium wilt, was of slight importance in scattered locations. Rhizoctonia solani, root rot, occurred locally; it caused some damage to early plantings in coastal areas. Thielaviopsis basicola causing root rot and damping-off occurred locally and caused slight loss. Uromyces phaseoli var. typica, rust, occurred in the southern coastal districts. Mosaic (virus) was scattered in distribution. Moderate infection was observed in one field in San Joaquin County.

PISUM SATIVUM, PEA. The Ascochyta diseases caused by A. pisi, A. pinodella, and Mycosphaerella pinodes, occurred locally early in the season and caused slight damage. Chalosporium pisicola, scab, was reported from Southern California. Erysiphe polygoni, powdery mildew, was general, especially in the coastal regions, but damage was slight. Fusarium solani f. pisi, root rot, was local in occurrence. It was common on fall peas in San Benito County but damage was slight. It was also reported from Southern California. Peronospora pisi (P. viciae) was scattered in winter plantings and caused slight damage. Slight amounts of Pseudomonas (Phytomonas) pisi, bacterial blight, were reported from San Mateo and San Joaquin Counties. Rhizoctonia solani, root rot, was scattered in occurrence and caused slight damage. Scattered infection by Septoria pisi, leaf spot, occurred on winter peas. Mosaic (virus) was general in distribution. It was widespread in coastal plantings of spring and summer peas. Total damage was slight.

RAPHANUS SATIVUS, RADISH. Albugo candida, white rust, and Peronospora parasitica, downy mildew, were scattered in occurrence and of negligible importance. Boron deficiency was observed in San Mateo County.

RHEUM RHAPONTICUM, RHEUBARB. Light infection by Puccinia phragmites, rust, occurred in Monterey County. Mosaic (virus) was observed locally near Hayward; damage was slight.

SOLANUM TUBEROSUM, POTATO. Actinomyces scabies, scab, was general but caused slight damage.

Alternaria solani, early blight, was scattered in occurrence and caused slight damage.

Corynebacterium sepehonicum, bacterial ringrot, was found in scattered locations. The disease appears to be spreading. An increase in amount in 1943 was thought to be due to an insufficient supply of certified seed, and present indications point to the same situation for the coming season.

Pellicularia filamentosa (Rhizoctonia solani), black scurf, was general but usually not serious.

Phytophthora infestans, late blight, occurred in scattered areas, but was severe only locally. It was common on volunteer plants in late fall and winter near Colma in San Mateo County. It was severe on above-ground

parts in some fields in Kern County. Tuber infection was not common. The fungus was also present on Solanum sarachoides, a common weed, near Colma.

Verticillium albo-atrum, Verticillium wilt, occurred locally. In several fields in San Benito County an estimated 95% of the plants were affected.

Mosaic (virus) was general but usually not serious.

SPINACIA OLERACEA, SPINACH. Heterosporium variable, leaf spot, was observed in scattered locations. It was common near Gilroy. Damage was slight. Peronospora effusa, downy mildew, was general in the coastal areas and severe locally. Heavy infection was observed in some fields in the Salinas Valley. Mosaic (virus) occurred to a slight extent. A slight amount of spotted wilt (virus) was observed at San Pablo.

TRAGOPOGON PORRIFOLIUS, SALSIFY. At Colma light infection by Albugo tragopogonis, white rust, was noted, and a few plants affected by aster yellows (virus) were found.

VICIA FABA, HORSE BEAN. Mosaic (virus) occurred on horse bean. Spotted wilt (virus) was noted causing slight damage at San Pablo. A scab on the pods, of unknown cause, occurred locally in Alameda and Contra Costa Counties; loss was slight.

VIGNA SINENSIS, CONPEA, BLACK EYE BEAN. Erysiphe polygoni, powdery mildew, occurred locally and caused slight damage. Fusarium oxysporum f. tracheiphilum, Fusarium wilt, was observed in Merced and Stanislaus Counties. The disease was more abundant than usual and caused heavy loss in some fields. Fusarium solani f. phaseoli, root rot, was local in occurrence and caused slight loss. Heterodera marioni, rootknot, was local and of moderate importance. Rhizoctonia solani, root rot, was general but caused slight damage. Sclerotium bataticola, charcoal stem rot, was observed on this host in Stanislaus and Merced Counties; damage was slight. Verticillium albo-atrum, Verticillium wilt, was reported from Merced County.

#### CEREALS AND FORAGE CROPS

AVENA SATIVA, OAT. Puccinia coronata, crown rust, and P. graminis var. avenae, stem rust, caused moderate and slight losses, respectively, in the Sacramento Valley.

HORDEUM VULGARE, BARLEY. Erysiphe graminis, powdery mildew, was general but not serious. More foot rot due to Gibberella zeae (G. saubinetii) was noted than usually occurs. Helminthosporium gramineum, stripe, was found in 1/4 of the barley fields in the Sacramento Valley; damage was moderate. H. sativum, foot rot, and H. teres, net blotch, were scattered in occurrence. Ophiobolus graminis, take-all, foot rot, caused moderate damage in one area in Solano County. Rhynchosporium secalis, scald, was general and moderately severe. Ustilago jensenii (U. hordei) covered smut, was reported in 12 fields in the Sacramento Valley; infection ranged as high as 15%.

LINUM USITATISSIMUM, FLAX. Colletotrichum linicolum, anthracnose, occurs generally where flax is grown; in 1943 there was less than usual. Mycosphaerella linorum (Phlyctaena linicola) occurs locally in Fresno County. More than usual was noted; infection was moderate.

MEDICAGO SATIVA, ALFALFA. Scattered slight attacks by Cuscuta sp., dodder, were observed. Ditylenchus dipsaci, stem nematode, is scattered in

distribution. Serious attacks were noted in the Antelope Valley in Los Angeles County. Fusarium oxysporum f. medicaginis, Fusarium wilt, occurred to a slight extent. Phymatotrichum omnivorum, root rot, occurs locally, in Imperial County. Corynebacterium insidiosum (Phytomonas insidiosus), bacterial wilt, is general and serious in the central Valleys. Pseudopeziza medicaginis, leaf spot, occurs in scattered slight amounts. Rhizoctonia solani causing root canker (reported in Phytopath. 33: 1081) occurs in Southern California. Stagonospora meliloti, crown rot, is general in distribution and of moderate importance. Uromyces striatus var. medicaginis, rust, was general in the southern part of the State. Urophlyctis alfalfae, crown rot, was of local occurrence in the coastal region, and in some places was severe.

Dwarf (virus) was general in the southern half of the San Joaquin Valley and southward. It is severe and causes heavy loss in some areas.

TRITICUM AESTIVUM, WHEAT. Gibberella zeae (G. saubinetii) occurred locally in more than usual amounts, causing moderate loss. Ophiobolus graminis, takeall, foot rot, was observed in one area, in Solano County. Puccinia graminis var. tritici, stem rust, was general. P. rubigo-vera var. tritici, leaf rust, occurred in slight amounts. A small amount of Tilletia spp., bunt, was observed; the disease is well controlled by seed treatment.

VICIA sp., VETCH. Mosaic (virus) was observed on this host.

VIGNA SINENSIS, COPEA. See under vegetable crops.

ZEA MAYS, CORN. Fusarium moniliforme, ear mold, was general but of slight importance. Scattered light infection by Puccinia sorghi, rust, and slight damage by Ustilago maydis (U. zeae), smut, were noted.

#### FRUIT AND NUT CROPS

AMYGDALUS COMMUNIS, ALMOND. Armillaria mellea, root rot, was general. One report of Cladosporium carpophilum, scab, was received, from Monterey County; no damage was caused. Coryneum carpophilum (C. beijerinckii), shot hole, blossom blight, was severe, especially in the San Joaquin and Sacramento Valleys. More than the usual amount occurred. A reduction in yield amounting to 15% was reported from Southern California.

Monilinia (Sclerotinia) laxa, blossom blight, was general. Infection was usually slight, but locally it was heavy.

Sclerotinia sclerotiorum, green rot, jacket rot, was scattered in distribution and caused moderate loss.

Tranzschelia pruni-spinosae, rust, was causing some defoliation in the Salinas Valley. The disease was less prevalent than usual.

Verticillium albo-atrum, blackheart, was scattered, causing slight damage, in the San Joaquin Valley.

Phytophthora sp., canker, caused slight damage.

Agrobacterium tumefaciens, crown gall, was general. Pseudomonas syringae (Phytomonas cerasi), bacterial canker, was less prevalent than usual.

Mosaic (virus, peach-mosaic, apricot form) occurs in Southern California. It is widespread in the Banning area. The chief concern due to its presence is the possibility of spread to peach, which present records indicate is very slow if it takes place at all.

Ringspot (virus) is scattered in occurrence.

Burn, cause unknown but suggested to be due to high temperatures since it never occurs except with temperatures of 100°F or over, was reported

from Southern California.

Little leaf due to zinc deficiency is scattered in distribution in the San Joaquin Valley.

AMYGDALUS PERSICA, PEACH. Armillaria mellea, root rot, occurred in scattered locations, especially in the Sacramento Valley.

Cladosporium carpophilum, scab, was local in distribution and not serious.

Coryneum carpophilum (C. beijerinckii), blossom blight, shot hole, was general in the northern part of the San Joaquin Valley. Early fall rains were conducive to twig infection.

Monilinia fructicola and M. laxa (Sclerotinia), brown rot, twig and blossom blight, was general. Usually, no distinction is made between the diseases caused by the 2 species. M. laxa seems to be the more common.

Sphaerotheca pannosa, powdery mildew, was general in occurrence but of slight importance. In a few scattered orchards at higher elevations in Southern California 10% damage was reported.

Leaf infection by Taphrina deformans, leaf curl, was heavier than usual. Light infection was reported from Southern California.

Slight damage was caused by scattered infections of Tranzschelia prunispinosae, rust.

Verticillium albo-atrum, blackheart, occurred in scattered locations in the San Joaquin Valley; damage was slight.

Buckskin (virus) was scattered in distribution. It was found in 5 additional counties, but was not abundant in any.

Mosaic (virus) was found in Los Angeles, San Bernardino, San Diego, and Riverside Counties. Slightly less than 1000 new cases of mosaic were found in Southern California by inspectors. All known cases have been removed except for one orchard with approximately 375 cases.

Ringspot (virus) is general in distribution. Trees showing symptoms are always new cases since they show symptoms only one year. The virus is present in a variety of hosts and an annual spread takes place.

Yellow bud or Winters mosaic (virus) was observed locally near Winters in Solano and Yolo Counties.

Little leaf due to zinc deficiency occurred in scattered locations in the San Joaquin Valley.

Chlorosis caused by iron deficiency occurred locally.

Sims spot, cause unknown, occurred locally in San Joaquin County.

CASTANEA DENTATA, CHESTNUT. Endothia parasitica, blight, was observed in San Joaquin County. Other areas where blight has appeared now seem to be free from the disease.

CITRUS spp. (general). Penicillium digitatum and P. italicum, blue and green mold decay, were more prevalent than usual. Decay follows water spot on navel orange. Phytophthora citrophthora and P. parasitica, brown rot of fruit and gummosis, were favored by heavy rainfall and were more prevalent than usual. The development of Sclerotinia sclerotiorum, cottony rot, was favored by rainy weather following wind damage. Septoria fruit spot caused by Septoria sp. was of slight importance.

Manganese deficiency, exanthema due to copper deficiency, and mottle leaf due to zinc deficiency were of slight importance. High pH chlorosis caused by inability to assimilate iron, was also of slight importance.

There was less low temperature injury to grapefruit than usual.

CITRUS LIMONI, LEMON. Diaporthe citri, "decorticus", was of moderate importance. Trichoderma lignorum, Trichoderma rot, occurred on lemons

in storage, but was of slight importance. Endoxerosis due to water relations was also of slight importance.

**CITRUS SINENSIS, ORANGE.** An increased amount of fruit splitting this year favored the development of Alternaria citri, black rot, on navel oranges. Armillaria mellea, root rot, was favored by heavy rains and runoff, and more than usual was noted, on Valencia orange.

Water spot of navel oranges is caused by long rainy periods. Weather was favorable for its development but as yet it is too early in the season to estimate loss.

**FICUS CARICA, FIG.** Botrytis cinerea causing branch blight and fruit rot was general but not serious. Fusarium moniliforme, endosepsis, occurred generally. Pratylenchus pratensis, nematode root canker, was found in scattered locations. Mosaic (virus) was generally noted.

**FRAGARIA, STRAWBERRY.** Scattered infections by Mycosphaerella fragariae, leaf spot, caused slight damage. Sphaerotheca humuli, powdery mildew, was observed in the coastal area of central California. Verticillium albo-atrum, Verticillium wilt, occurred in the Salinas Valley. Yellows or xanthosis (virus) was general.

**JUGLANS REGIA, PERSIAN WALNUT.** Microstroma juglandis, leaf spot, was scattered in distribution and of no importance. Phytophthora cactorum, basal rot, occurred in scattered locations. One report of Rosellinia necatrix, root rot, was received, from Orange County. Xanthomonas (Phytomonas) juglandis, bacterial blight, was general and more prevalent than usual; loss was moderate.

Boron injury due to excess of boron in the soil or in irrigation water was scattered in distribution and serious in some localities. Girdle or black line, probably due to incompatibility at the graft union, was important in some orchards. Trees die at about the time they begin to bear. Little leaf due to zinc deficiency was noted in scattered locations, especially in the San Joaquin Valley.

**MALUS SYLVESTRIS, APPLE.** Erwinia amylovora, fireblight, was general in occurrence but of slight importance. Podosphaera leucotricha, powdery mildew, occurs wherever apples are grown, and was more important than usual in 1943, resulting in an estimated 10% reduction in yield. Rosellinia necatrix, root rot, was reported from Santa Cruz County. Venturia inaequalis, scab, occurred in more than the usual amounts in scattered locations.

Bitter pit due to unfavorable water relations was reported from Butte County. Boron and zinc deficiencies were scattered and not serious.

**OLEA EUROPAEA, OLIVE.** Cercospora cladosporioides, fruit spot, was reported only from San Diego County. Spots appear on the fruit while it is still green. The disease probably causes no loss on fruit either for ripe pickles or for oil.

Scattered slight infection by Cycloconium oleaginum, peacock spot, was present on fruit late in the season in Southern California.

Agrobacterium (Phytomonas) savastanoi, olive knot, was scattered in distribution and mostly of moderate importance, although heavy infections were observed locally.

Dieback due to boron deficiency was scattered and of moderate importance. Less occurs than in previous years because most growers in affected areas have applied boron to the soil.

A fruit spot of unknown cause, possibly due to climatic conditions, was reported only from San Diego County. The disease is of possible im-

portance in the manufacture of ripe pickles because of fruit discoloration. It was previously confused with the peacock spot.

PERSEA AMERICANA, AVOCADO. Phytophthora spp. caused trunk canker in Southern California. Decline and collapse occurs locally in Southern California in heavy or badly drained soils where excess water is present. The relation of parasitic organisms to the trouble is not determined.

PRUNUS AFRICA, APRICOT. Armillaria mellea, root rot, was general. Coryneum carpophilum (C. beijerinckii), blight, shot hole, occurred in the interior Valleys, causing moderate damage.

Monilinia laxa and M. fructicola (Sclerotinia), brown rot, blossom blight, were general, and very important, especially the blossom blight. An estimated 10% reduction in yield was reported from Southern California, where the disease seems to become more severe annually. Most of the damage on apricot is thought to be due to M. laxa.

Sclerotinia sclerotiorum, green rot, jacket rot, was more common than usual and was serious in some localities. Scattered light infection by Tranzschelia pruni-spinosae, rust, was observed.

Pseudomonas syringae (Phytomonas cerasi), bacterial canker, was scattered in distribution and less prevalent than usual.

Mosaic (virus of peach mosaic, apricot form) was general in Southern California. The virus is quite general in orchards on the west side of Hemet. Damage to apricot is slight but concern is felt over the possible spread to peach.

Little leaf due to zinc deficiency occurred in scattered locations especially in the San Joaquin Valley.

Tumor of unknown cause was observed in Santa Clara County.

PRUNUS sp., CHERRY. Scattered infection by Coccomyces hiemalis, leaf spot, caused slight damage in Solano and Napa Counties. Monilinia laxa and M. fructicola (Sclerotinia), brown rot, blossom blight, were scattered and less than usual in prevalence. Only a few cases of appreciable loss were noted. The fruit rot phase is of more importance than the blossom blight phase on cherry.

Pseudomonas syringae (Phytomonas cerasi), bacterial canker, was scattered in occurrence and of slight importance.

The virus diseases buckskin and crinkle caused slight damage. Buckskin was observed in Solano and Napa Counties; crinkle occurred generally.

Chlorosis due to iron deficiency was local and of slight importance. Little leaf due to zinc deficiency was scattered in occurrence.

PRUNUS DOMESTICA, PRUNE, PLUM. Armillaria mellea, root rot, was severe in the Santa Clara Valley. Monilinia laxa and M. fructicola (Sclerotinia) causing brown rot and blossom blight were prevalent in Sonoma and Santa Clara Counties; damage was moderate. Pseudomonas syringae (Phytomonas cerasi) bacterial canker, was scattered in distribution and caused slight to moderate damage. Light infection by Tranzschelia pruni-spinosae, rust, was observed in the Santa Clara Valley.

Diamond canker, probably due to a virus, occurred in Santa Clara and Alameda Counties.

Dieback caused by potassium deficiency was serious in the local areas where it occurs. Little leaf due to zinc deficiency was observed in scattered locations.

PYRUS COMMUNIS, PEAR. Erwinia amylovora, fireblight, was general but less than usual in prevalence. No serious outbreaks occurred this year.



Monilinia fructicola and M. laxa (Sclerotinia), brown rot, were found occasionally but damage was small. Pseudomonas (Phytomonas) syringae, blast, was scattered in distribution and of slight importance. Venturia pyrina, scab, occurred in scattered locations. It was more severe than usual, particularly in the coastal counties. It was also troublesome in the foothills.

Fruit pitting due to virus was reported from Eldorado County.

Black end, associated with the use of Oriental rootstocks, was of slight importance. Chlorosis due to iron deficiency was observed in scattered locations in Santa Clara and Contra Costa Counties.

RUBUS spp., DEWBERRY, YOUNGBERRY, BOYSENBERRY. Scattered infection by Elsinoë veneta, anthracnose, was noted. One plant affected by Leptosphaeria coniothyrium, cane blight, was observed in Santa Cruz County. Septoria rubi, leaf and cane spot, was general. Verticillium albo-atrum, Verticillium wilt, occurred locally, in Santa Cruz County.

VITIS CALIFORNICA, WILD GRAPE. Plasmopara viticola, downy mildew, was collected in Eldorado County. This disease has never been found on cultivated grape in California.

VITIS VINIFERA, GRAPE. Armillaria mellea, root rot, was scattered in occurrence and not serious on grape. Botrytis cinerea, fruit rot, occurred generally in less than usual amounts. Cryptosporella viticola, dead arm, occurred locally, especially in Sacramento County. It was of moderate importance.

Pure cultures of a Diplodia causing fruit rot were obtained from several mummied fruits from Tulare County. Only the hyaline one-celled Macrophoma spores were present on the fruit.

Uncinula necator, powdery mildew, was general, causing moderate loss. It is usually well controlled.

Pierce's disease (virus), is general throughout the grape-growing sections of the State. Especially heavy infection occurs in the southern part of the San Joaquin Valley. Loss from the disease is heavy. It threatens to wipe out a number of vineyards unless the diseased vines are replaced.

Black measles, cause unknown, was general and of moderate importance.

Little leaf due to zinc deficiency was scattered in occurrence and caused slight damage.

#### SPECIAL CROPS

ATROPA BELLADONNA, BELLADONNA. Phytophthora parasitica, root rot, and Verticillium albo-atrum, wilt, were reported from Southern California.

BETA VULGARIS, SUGAR BEET. Scattered slight infection by Aphanomyces cochlioides, seedling root rot, was observed. Light infection by Pero-nospora schachtii, downy mildew, occurred in most fields. Phoma betae, leaf spot, stem spot, was not causing loss in commercial plantings but threatened to be serious on the seed crops, causing loss from damping-off. Rhizoctonia solani, dry rot canker, was scattered in occurrence. Loss in one field was 50%; very light loss was observed in other fields. Scattered slight attacks by Sclerotium bataticola, charcoal rot, occurred in the interior Valleys. S. rolfsii, southern root rot, was scattered in distribution. In most fields infection was light, but heavy loss was reported in one field. Uromyces betae, rust, was general and abundant in most places but was doing little damage. Curly top (virus) was generally

distributed, especially in the interior, but infection was less than usual. Infection by mosaic (virus) was scattered and light. Slight loss from boron deficiency occurred locally in San Mateo County.

BORAGO OFFICINALIS, BORAGE. Ramularia sp., leaf spot, was observed in San Mateo County.

GOSSYPIUM, COTTON. Verticillium albo-atrum, Verticillium wilt, was observed in the San Joaquin Valley.

HUMULUS LUPULUS, HOP. Infection by Pseudoperonospora humuli, downy mildew, was local and less than usual.

MENTHA sp., MINT. Puccinia menthae, rust, was observed at Berkeley.

#### MISCELLANEOUS PLANTS

ACER. Rhytisma punctatum, speckled tar spot, occurred locally on A. macrophyllum. One report of R. acerinum, tar spot, on A. saccharinum, was received from Mendocino County.

ANTIRRHINUM MAJUS, Peronospora antirrhini, downy mildew, was observed on young plants in the Bay region. Puccinia antirrhini, rust, was general.

AZALEA. Botrytis sp., flower blight, occurred in scattered locations. Exobasidium vaccinii, leaf curl, was reported in San Diego County. Ovulinia azaleae, flower blight, was serious in scattered places, mostly southern. Septoria azaleae, leaf spot, occurred in scattered locations.

BEGONIA. Xanthomonas (Phytomonas) begoniae, bacterial leaf spot, was general.

CALCEOLARIA. Spotted wilt (virus) was reported from the Bay region.

CAMELLIA. Botrytis sp., flower rot, and Sclerotinia camelliae, flower spot, were scattered in nurseries.

DAHLIA. Mosaic (virus) was general. Spotted wilt (virus) occurred in coastal regions.

DICHONDRA REPENS. Sclerotium rolfsii, southern root rot, was reported from Ventura County.

DORONICUM PLANTAGINEUM. Erysiphe sp., powdery mildew, was reported from Berkeley.

EUCALYPTUS GLOBULUS. Polyporus sulphureus, heart rot, was scattered in distribution. Damage is difficult to determine: the fungus weakens the trees which are then more easily blown over.

GLADIOLUS. Fusarium oxysporum f. gladioli, Fusarium rot; Penicillium gladioli, Penicillium rot; and Pseudomonas (Phytomonas) marginata, scab; occurred generally.

IRIS. Heterosporium gracile, leaf spot, was general.

LIGUSTRUM. Rosellinia necatrix, root rot, was reported from Marin, San Joaquin, and Riverside Counties.

LILIUM LONGIFLORUM var. EXIMUM. Botrytis elliptica, blight, occurred. Mosaic (virus) was reported from Humboldt County, and yellow flat (virus) from Humboldt and Del Norte Counties.

NARCISSUS. Fusarium sp., basal rot, and Stagonospora curtisii, leaf scorch, were general.

ORNITHOGALUM. Sclerotium rolfsii, root rot, was reported once, from Los Angeles County.

PELARGONIUM PELTATUM. Xanthomonas (Phytomonas) pelargonii, leaf spot, was reported only from Sacramento County.

**PFOTINIA.** Erwinia amylovora, fireblight, and Fusicladium photinicola, scab, were general.

**PLATANUS.** Gnomonia veneta, anthracnose, was general and moderately severe in the spring. Stigmata platani, leaf spot, was reported from Santa Clara County.

**POPULUS.** Marssonina populi, leaf spot, was general. Taphrina aurea, leaf blister, was reported from Placer County.

**PRIMULA.** Pseudomonas (Phytomonas) primulae, bacterial leaf spot, occurred locally, at Colma.

**ROSA.** Agrobacterium tumefaciens, crown gall, Leptosphaeria coniothyrium (Coniothyrium fuckelii), stem canker, and Sphaerotheca pannosa, powdery mildew, occurred generally on roses. Diplocarpon rosae, black spot, was also general in moist regions. Phragmidium sp., rust, occurred generally but especially near the coast.

**SCHINUS MOLLE.** Armillaria mellea, root rot, was general on pepper trees in southern California. Fomes applanatus, heart rot, was scattered in distribution.

**TROPAEOLUM MAJUS.** Nasturtium is generally infected by the spotted wilt virus near the coast, growing the year round and commonly carrying the virus.

**ZANTEDESCHIA.** Infection by Erwinia arborescens, soft rot, was scattered and moderate. Phytophthora richardiae, root rot, was scattered in distribution. Spotted wilt (virus) occurred in coastal areas. Calla is possibly important as a carry-over host of this virus.

**ZINNIA.** Erysiphe cichoracearum, powdery mildew, was general. Spotted wilt (virus), occurred locally, in the Bay Region.

#### VEGETABLE DISEASES OBSERVED IN SOUTHERN CALIFORNIA DURING THE WINTER SEASON OF 1943-1944

Seth Barton Locke

Collaborators in these surveys were Dr. Kenneth Baker of the University of California, Los Angeles, Dr. John Middleton, University of California, Riverside, and Dr. Wm. C. Snyder, University of California, Berkeley.

**ALLIUM CEPA, ONION.** Thirteen plantings for seed in the Imperial Valley were visited at intervals from mid-December through mid-March. No disease was found. Plantings visited elsewhere in Southern California were also free from disease.

**ALLIUM PORRUM, LEEK.** One large planting visited in December near Lompoc and another near Palm City were both free from disease.

**APIUM GRAVEOLENS, CELERY.** Traces of Fusarium yellows (F. oxysporum f. apii) (F. orthoceras var. apii) to 0.3% infection, and traces to 4% of pink rot (Sclerotinia sclerotiorum) were observed in plantings near Chula Vista. Septoria apii (late blight) was abundant in the coastal valleys, causing serious damage to the foliage where no control measures were used. Intensity ranged from traces to destruction of 50% of the foliage.

**BETA VULGARIS, BEET AND CHARD.** In the coastal valleys table beets were generally affected with leaf spot (Cercospora beticola) although not with sufficient severity to cause appreciable damage. Downy mildew (Peronospora schachtii) was observed in December in a planting of chard near

Lompoc, affecting from 1 to 2% of the plants. Rust (Uromyces betae) was observed in infections ranging from a trace to very abundant on table beets in the coastal valleys from Lompoc to Palm City, from mid-December to early March. Traces of curly top (virus) were seen in December in a planting of table beets near Arroyo Grande.

BRASSICA CLERACEA var. BOTRYTIS, BROCCOLI. Alternaria brassicae (A. herculea, gray leaf spot) was observed in severe form near Guadalupe in December, affecting 100% of the plants. Traces were observed in many plantings thereafter, but the disease did not appear in severe form again until early in March, when it caused 25% defoliation in a planting near Lompoc. Peronospora parasitica (downy mildew) was common in the coastal valleys, occurring in amounts ranging from trace to abundant and causing defoliation in isolated cases.

Heavy rains in late February and early March flooded many fields in the vicinity of Palm City. In 2 plantings 30% of the plants were dying from an undetermined root rot.

Traces of aster yellows (virus) were observed in a planting near Guadalupe, and of mosaic (virus) near Palm City and Lompoc.

BRASSICA CLERACEA var. BOTRYTIS, CAULIFLOWER. Albugo candida (white rust) was observed as old inactive lesions on seed stalks of an abandoned planting near Lompoc. No active lesions were seen.

Alternaria brassicae (A. herculea, gray leaf spot) appeared only as an occasional lesion on old leaves until the last week in February, when it became abundant on old and young foliage in the vicinity of Lompoc and Guadalupe and increased somewhat in the Mission Valley and Palm City districts.

Peronospora parasitica (downy mildew) was present in all of the coastal valleys. Usually it appeared on the oldest leaves in young plantings and increased in severity with the age of the planting. In the most severe cases from 75 to 100% of the plants were affected. In 2 old, abandoned plantings the organism had become systemic in the curds.

Phytophthora megasperma (root rot) destroyed about 10% of the plants in 4 plantings on very wet land near El Monte.

Aster yellows (virus) was observed in small amounts near Guadalupe in December and near Palm City in January. Black ring (virus) was seen on a single plant near Compton in December. Mosaic (virus) was the most destructive disease observed on this crop. Intensity ranged from traces in young plantings to 100% infection in the worst instances.

BRASSICA CLERACEA var. CAPITATA, CABBAGE. Alternaria brassicae (A. herculea, gray leaf spot) was observed on the oldest leaves near the ground. It did not affect production seriously. Botrytis cinerea (gray mold rot) was observed on an old planting near Lompoc in December, rotting the leaves, affecting the heads, and invading the stems near the soil. Peronospora parasitica (downy mildew) was commonly present in the coastal valleys and appeared in the Imperial Valley in mid-February. The old leaves were frequently heavily attacked and the outer leaves of the heads were sometimes spotted. From traces to 10% of the plants were affected by mosaic (virus) in the coastal valleys.

BRASSICA CLERACEA var. GEMMIFERA, BRUSSELS SPROUTS. The terminal sprouts of a planting near Pismo Beach were affected by Botrytis cinerea (gray mold rot) in a few cases. A trace of mosaic (virus) was observed near Pismo Beach.

BRASSICA RAPA, TURNIP. Alternaria brassicae (A. herculea, gray leaf spot) was very abundant in a planting near Palm City, observed in March.

CAPSICUM FRUTESCENS, PEPPER. Phytophthora capsici (root rot) was observed affecting from 3 to 5% of the plants in a planting near Palm City. Verticillium albo-atrum (wilt) affected from 3 to 5% of the plants in planting near National City. About 30% of the plants in an old abandoned planting near San Juan Capistrano were affected by mosaic (virus).

CICHORIUM ENDIVIA, ENDIVE. In a field near Lompoc, observed in March following heavy rains, from 3 to 5% of the plants were rotted to the ground by Botrytis cinerea (gray mold rot). A trace and 5%, respectively, of the plants in 2 plantings near Guadalupe and Lompoc were affected by Sclerotinia sclerotiorum (drop).

CUCURBITA PEPO, SUMMER SQUASH. Erysiphe cichoracearum (powdery mildew) almost completely defoliated an old planting near Oceanside. A young planting nearby that was dusted with sulfur was free from disease. An occasional plant in a planting near Venice was affected by mosaic (virus).

CYNARA SCOLYMUS, ARTICHOKE. A planting near Lompoc on very wet soil showed 5% of the plants affected by Phytophthora megasperma (root rot). In 3 plantings near Guadalupe and Lompoc 10% of the plants were severely defoliated by Ramularia cynarae (leaf spot), with flower stalks and heads damaged in some cases.

DAUCUS CAROTA, CARROT. Cercospora carotae (leaf blight) was commonly present in the coastal valleys. In one planting near Ventura the foliage was badly damaged. An undetermined root rot corresponding closely in appearance to that caused by Phytophthora megasperma was seen affecting 100% of the roots in a planting on wet heavy soil near El Monte.

LACTUCA SATIVA, LETTUCE. Botrytis cinerea (gray mold rot) was observed in small amounts near Palm City, and in another field near Arroyo Grande was found affecting 50% of the heads. Bremia lactucae (downy mildew) did not appear in coastal valleys until mid-February and in the Imperial Valley until early March. It became abundant in the coastal valleys by early March. Erwinia carotovora (bacterial soft rot) caused considerable damage near Ventura following injury from frost and drying winds. Sclerotinia sclerotiorum (drop) occurred in traces late in January in the coastal valleys. In early March it was present in the Imperial Valley, affecting 1% of the plants in some cases. One field near Arroyo Grande was 5% affected in early March. Mosaic (virus) was observed in traces in San Diego and Imperial Counties.

LYCOPERSICON ESCULENTUM, TOMATO. Alternaria solani (early blight) was abundant in old plantings in the Coastal valleys. Phytophthora infestans (late blight) was observed causing fruit rot in old plantings near Vista, and probably was responsible for most of the defoliation there. Septoria lycopersici (leaf spot) was found in a single planting near Oceanside, where it was very abundant on the foliage. Traces of Verticillium albo-atrum (wilt) were observed in plantings near Palm City. Curly top (virus) was observed affecting about 30% of the plants in an old planting near Arroyo Grande and also in small amounts in early plantings in the Imperial Valley. Double-virus streak was abundant in a large planting of staked tomatoes near Arroyo Grande. Traces of spotted wilt (virus) were observed in plantings near Palm City.

PHASEOLUS VULGARIS, BEAN. Erysiphe polygoni (powdery mildew) was observed affecting 100% of the plants in a planting near Chula Vista. Rhizoctonia solani (root rot) affected occasional plants in a small planting near

## Chula Vista.

PISUM SATIVUM, PEA. Ascochyta spp. (Ascochyta blight) appeared on the lower leaves of most of the plants in one planting near Venice and in traces elsewhere in the coastal valleys. Cladosporium pisicola (scab) was observed in traces on leaves and pods in the coastal valleys. Erysiphe polygoni (powdery mildew) was found in an old, abandoned planting in the Imperial Valley.

Fusarium oxysporum f. pisi race 1 (F. orthoceras var. pisi) (Fusarium wilt) affected 2% of the plants in a field near Chula Vista. F. oxysporum f. pisi race 2 (F. oxysporum f. 8) (near wilt) was identified by Dr. W. C. Snyder in 2 plants of one lot sent from the Niland district. F. solani f. pisi (Fusarium root rot) was causing serious losses in the Niland district of the Imperial Valley, where peas have been cropped repeatedly on the same land, for as long as 20 years in some cases. In the worst-affected fields 75% of the plants had been killed by mid-February.

Pythium sp. (root rot) was present in the Niland district, as was Rhizoctonia solani (root rot).

Mosaic (virus) was observed in a planting near Venice affecting from 5 to 10% of the plants. Less than 1% was associated with Pea Virus 1. Traces of a virus disease, not Pea Virus 1, were observed in Arroyo Grande.

RAPHANUS SATIVUS, RADISH. Plantings observed in Mission Valley were free from disease.

SINAPIS ALBA, MUSTARD. Erysiphe polygoni (powdery mildew) was observed affecting 100% of the plants in a planting near Palm City.

SPINACIA CLERACEA, SPINACH. Peronospora effusa (downy mildew) was observed in traces in Mission Valley and near Palm City. Traces of mosaic (virus) were observed in Mission Valley.

## SUMMARY OF PLANT DISEASE SURVEY IN OREGON IN 1943

Lytton W. Boyle

### General Remarks

Acknowledgment is first due to the staff of State and Federal workers at the Oregon Experiment Station for certain data and observations included in the summarized notes; also to the staff of the Oregon Extension Service, and Oregon State Department of Agriculture for suggestions and assistance in locating crops for observation.

Data regarding losses due to specific diseases in the State or its respective areas have been presented in a more qualitative than quantitative way. Incidents of severe losses or the relative importance of certain troubles have been noted. To obtain basic data on which to determine losses would require very detailed survey not possible in the available time. The variable nature of the areas west of the Cascades is very marked and makes a basis for estimate more difficult to obtain. Marked changes in soil and weather occur within distances where it would not be suspected. The diversity, thus the lack of continuity of certain crops, also adds to the difficulty of forming an over-all quantitative estimate. For example, one may observe a clover field badly infested with rust, and after observation of several fields conclude these to be a representative sample of the area.



Without being aware of entering a different area, upon examination of what would be suspected to be a comparable field, one may find very little rust, but mildew will predominate. One may note very little, if any, scab in samples of potatoes at a loading point; but after a short drive down an apparently level highway to the next loading point, scab may be very severe and evident to some degree on every lot of tubers.

Statistical estimates or mere judgment are both based on samples assumed to be taken within the continuous limits of a reasonably normal distribution. Whether the fields in this area would form into distributions acceptable to the statistician is a pertinent question in attempts to make estimates either by mathematical methods or by judgment.

Such great variety of areas based on ecological factors make pathological problems more confounding to the farmer, and very interesting and formidable to the specialist.

Without reference to specific diseases or crops, three types of areas exist from the standpoint of prevalence and control of plant diseases.

There are, first, relatively large areas where culture of certain crops has been intensive, but control has been cooperative since profitable production is not possible without it. When practicable methods of control are known, these are used effectively in such areas. In such areas Mr. Jones has the habit of watching Mr. Smith to see that nothing occurs that will jeopardize his crop. This helps in the early recognition of troubles.

In contrast, there are small somewhat isolated areas where certain crops have been grown intensively and continuously. This practice is tending to build up sources of inoculum that may become limiting factors in production. Rotation may be practiced in such areas in so far as control of fertility and soil inhabiting parasites are concerned, but sufficient separation does not seem possible to check the spread of air- or insect-borne inoculum effectively. In such areas the first appearances of disease are frequently overlooked by the grower since his isolation seems to have given him a false sense of security.

Diversified farming characterizes the third type of area. In such areas the first appearance of disease may not be noticed readily, or equipment and supplies suited to its control are frequently lacking when weather happens to be optimum for its development and spread. In such areas, the farmer is confronted with the problem of obtaining with a limited amount of capital, equipment suited to control of pests and diseases in his barn, his potato or tomato field, his small orchard, etc.

This summary covers primarily observations made on truck crops. At the time the survey was started, many cereal and fruit crops had been harvested, consequently the short time available could best be spent on the late truck crops developing in the fields. Data relative to the nut crops are not included since these have been summarized and reported by Dr. P. L. Miller (PDR 28:1 Jan. 1, 1944).

### Truck crops

In addition to production of truck crops for market as fresh or processed vegetables, seed production is also developing along the coastal and river areas. Since many of the truck crops are biennial, this entails holding the crop either through storage or in the field during dormancy of the winter months. Additional problems due to development of disease during this dormant phase in the seed crop production are as yet not well defined

in all cases, but are being watched closely. Except when noted to be otherwise, the general observations apply only to the crops west of the Cascade Range.

ALLIUM CEPA, ONION. Botrytis sp. was evident in lesions on stems and blighted florets. It was considered to be the primary cause of a poor seed crop near Logsdan (Lincoln County).

Peronospora destructor, downy mildew, was reported in 1942 to have been very prevalent and a serious problem in the western part of the State. In the current season only one specific record of the disease was made. In this instance, it was reported found in association with other fungi on the old "pipes" of plants that had yielded a poor seed crop.

Miscellaneous fungi were found on the stems and floret organs of plants that produced a light seed crop. Species of four genera of fungi (Macrosporium, Heterosporium, Stemphylium, and Ascochyta) were found on the floral organs. Macrosporium sp., Stemphylium sp., and Peronospora destructor were found in lesions on the stems.

Yellow Dwarf (virus) was recorded in only one instance in which 30% of the plants in a field in Union County were reported infected. Other fields noted in the same county were, however, described as of "excellent" health.

Malformed heads were noted on a high percentage of plants in a seed crop in Malheur County. The symptoms suggested the possibility that this might be the result of infection with aster yellows or with Dana's big bud virus. Aster yellows was very prevalent in an adjoining field of carrots.

APII-GRAVEOLENS, CELERY: Septoria apii, S. apii graveolentis, late blight, was evident in all fields of celery observed. Control practices had successfully held development of the disease in check and no serious loss was noted. In commercial plantings noted in Lane County, excellent control had been accomplished. In this area the disease was also less severe than usual in small plantings where control had been lax.

In Malheur County, one field showing approximately 10% celery yellows (virus) was recorded. The virus concerned was not specified. Traces of mosaic (calico type) (virus) were noted in same field as reported above.

Abnormal plants. Plants showing undesirable characters were evident in every locality where celery was observed. In some cases the characteristics were very suggestive of infection by a virus. In others, either virus infection or genetic variation seemed possible causes. On one type of plant, the leaves were filiform but the blister-like areas and mild mottle characteristic of infection of this host by cucumber virus 1 were not apparent. In another type the characteristic symptom was the chlorotic mottle but no necrosis or distortion of the petioles were evident. The characteristic of a third type was a stunted, witches'-broom type of heart. Only traces of the filiform type were evident in any locality. The stunted or witches'-broom type was more common. From 10 to 20% of the plants show this character in variable degrees. The loss is dependent on the market for poorer grades of celery.

ASPARAGUS OFFICINALIS, ASPARAGUS. Root rot. An irregular condition of the plants was very marked in asparagus plots near Canby. Some plants were very green, whereas others showed various degrees of yellowing or senility. The degree of senility was correlated with evident lesions in the rhizomes. Colletotrichum sp., Penicillium sp., and a bacterium were isolated from such specimens. According to growers, only 50% of expected crop was obtained

from such fields last spring.

BETA VULGARIS, BEETS (Table varieties). Only one record was made of scab (Actinomyces scabies). About 1/3 of plants in a field in Linn County were infected.

Leaf spot (Cercospora beticola) was generally distributed. An exception was an isolated experimental planting in Coos County. Although quite prevalent, no obvious loss was noted in either the root or seed crop.

Epicoccum sp. was found in December on leaves of plants remaining in a large garden planting in Lane County. Development had been late since root development appeared normal even though lesions were quite severe on the leaves at this date.

The occurrence of lesions of Phoma betae on seed stalks of some plants was recorded in one instance in Lincoln County.

Ramularia betae was found in leaf spots from several widely separated points. It was first recorded from Josephine County on July 12. It appeared to be more prevalent in earlier plantings when observed November 16 on the current crop to be held for seed. No apparent loss in root development was noted.

One instance of severe loss due to Sclerotium rolfsii was recorded near Scottsburg in Douglas County.

The recorded instances of occurrence of rust (Uromyces betae) on table beets during 1943 were generally distributed. Parasites are frequently found on the rust. Wide differences in susceptibility were noted between individual plants of the same variety in some lots of seed. The disease caused no apparent loss of the root crop but its importance on crops being held for seed is being watched.

Macrosporium, Stemphylium, Cladosporium, Heterosporium. Species of the foregoing genera have been noted fruiting in collections of leaf spots during the current year.

Root canker due to boron deficiency was recorded in Malheur, Multnomah, and Linn Counties.

BETA VULGARIS var., MANGELS. Cercospora beticola was prevalent but no apparent loss of root crop recorded. A crown canker was found on plants in a field near Scottsburg (Douglas County). Fusarium sp. was found in these lesions and on the roots. Only one record of Phoma sp., suspected to be Phoma betae, on mangels was made this season (Douglas County, October 3). Ramularia betae was reported from scattered points but there was no record of significant injury to the root crop. Uromyces betae was reported from scattered fields but there was no apparent loss in the root crop.

BETA VULGARIS var. CICLA, SWISS CHARD: Cercospora beticola, leaf spot, was scattered through one sizeable planting recorded in Lincoln County. Ramularia betae was recorded from two fairly large plantings in Lincoln County. "Only a scattering" was found. Uromyces betae, rust, was noted in 2 plantings in Lincoln County (November 22). Note was made of the unusual necrosis surrounding the pustules on this host.

BRASSICA CA PESTRIS, RUTABAGA. Erysiphe polygoni was evident on every leaf in a planting in Linn County (October 18).

BRASSICA OLERACEA var. ACEPHALA, KALE. Macrosporium sp. caused black leaf spots similar to those prevalent on mature cabbage in the same area. It was not a serious problem.

BRASSICA OLERACEA var. BOTRYTIS, BROCCOLI. Traces of ringspot (Myco-sphaerella brassicicola) were found on this host in Lincoln County, less

than on cabbage in same area. Traces of downy mildew (Peronospora parasitica) were noted but no severe damage was recorded.

BRASSICA CLERACEA var. BOTRYTIS, CAULIFLOWER. Black spot due to Macrosporium sp. and Alternaria circinans (Macrosporium brassicae) was prevalent in certain plantings on the coast but was found only on older mature plants and was not considered of economic importance.

Mycosphaerella brassicicola, ringspot, was reported on cauliflower planting in Lincoln County. It was found on plants of Roscoff No. 1, which has been reported to be resistant to ringspot in other areas. Only a trace of plants show clear cut symptoms due to Brassica Virus 3. Associated with this, about 25% of the plants showed necrosis of margins and along the midveins of older leaves. The midveins of the smaller inner leaves showed a distorted condition.

BRASSICA CLERACEA var. CAPITATA, CABBAGE. Botrytis cinerea was very prevalent on mature cabbage heads found standing in fields along the coast. No data was available regarding the loss if any, this may have caused in the cabbage crop. It may be a serious factor in the seed crop, however, depending on the ability of the bud to bolt without being parasitized by this fungus. Sclerotia are abundant in most instances. In some instances the fungus is evident on 100% of plants being held in the field for the seed crop.

Alternaria brassicae (Macrosporium herculeum) and Macrosporium sp., leaf spot, was quite prevalent. It probably will never be of import on the cabbage crop. It has been recorded to occur on the seed pods (Douglas County, June 15) and what role it may play in relation to the seed crop is not known.

In general only traces of Mycosphaerella brassicicola, ringspot, were noted. It was noted to occur at two new locations this season.

Injury due to Peronospora parasitica, downy mildew, was primarily on the young plants in seed beds. It was most prevalent in lower areas along coast and river bottoms. It has been observed that attack by mildew seems to make the plant more susceptible to attack by Macrosporium sp.

Plasmodiophora brassicae, club root, was prevalent on low lands along the coast. In some instances it was spread from greenhouses to Victory Gardens, causing loss of entire plantings. Some commercial plantings where crucifers have been previously grown, were estimated to be 85% infected.

Sclerotinia sclerotiorum was recorded to occur on stalk of seed crop but was causing no significant damage.

BRASSICA PENINSULARIS, CHINESE CABBAGE. A rosette type of growth was noted in scattered plants through one patch. No lesions of evident infection were noted on the plants. The symptoms are suggestive of infection by viruses on certain other hosts but the cause as yet is undetermined. Fly speck (virus) was evident on 75% of plants in a small field in Josephine County.

BRASSICA RAPA, TURNIP. Leaf spot (Cercospora albo-maculans) has been noted on the older leaves of plants along the coast. Powdery mildew (Erysiphe polygoni) in late season has been noted on nearly 100% of leaves of certain plantings. No damage was recorded to the root crop. Leaf spot (Macrosporium sp. "giant type") was recorded but appeared to be of no economic import. Ringspot (Mycosphaerella brassicicola) was reported from Lincoln County in November.

BRASSICA sp., WILD TURNIP. Leaf spot (Alternaria brassicae) (Macrosporium herculeum) was noted on a wild host adjacent to a cabbage field.

Leaf spot (Phoma sp.) was noted in Lane County on this wild host.

CITRULLUS VULGARIS, WATERMELON. A trace of wilt (cause undetermined) was noted in one planting in Douglas County.

CUCUMIS MELO, CANTALOUPE. A trace of wilt (cause undetermined) occurred in one planting in Douglas County adjacent to a planting of watermelons where a similar condition was noted.

CUCUMIS SATIVUS, CUCUMBER. Only one instance of severe loss caused by angular leaf spot (Pseudomonas lachrymans) was noted. It was prevalent in garden plantings along the coast. In most instances it occurs in late season. White pickle (virus) was noted in Multnomah County only. Less than 1% occurred in a large planting of this crop.

CUCURBITA MAXIMA, SQUASH. Only the Oidium stage of powdery mildew (Erysiphe cichoracearum) was found. The disease was prevalent on plantings in Linn County. Infection appears to have been late and it caused no obvious injury to the crop. Fruit rot (Fusarium tricinatum; Macrosporium sp.) is limited to the small late fruits on the vines. It appears the earlier formed, larger fruit make such heavy demands on the vine that the later formed fruit are weakened. The infection of the later fruits is probably more saprophytic than parasitic in nature.

DAUCUS CAROTA, CARROT. Leaf spot (Cercospora sp.) was prevalent in lower areas along coast or river bottoms. It was not severe and injury to root crop was not apparent.

Only one instance of root rot (Sclerotium rolfsii) was recorded during this year. It was very prevalent in a field in Douglas County where it was the cause of very severe injury to roots.

Leaf spot (Cladosporium sp., Heterosporium sp., Macrosporium sp., Mycosphaerella sp., and Stemphylium sp.). Two to four of the genera have been recorded as associated with leaf spots on this host. Specific tests of pathogenicity have not been made.

Aster yellows (virus) was quite general in distribution. In certain areas it was not so severe as in 1942. Reasons for the fluctuating severity of this disease are not apparent. It is generally agreed that it caused significant loss of crop, but without basic data on tonnage and quality of roots, evaluation of these losses are purely arbitrary.

Root cracks, chlorosis and necrosis of leaves. A complex of environmental factors in the soil seems the only explanation for the poor condition of several crops. In one instance in Lane County the crop from 6 acres was entirely lost. In Linn County a young crop was obviously going to yield not over 2/3 of what might be normally expected. Although bacterial rots and certain soil parasites were sometimes found associated with the poor condition of the crop, irrigation and drainage practices and soil complements appear to be primary factors.

LACTUCA SATIVA, LETTUCE. There was no opportunity to observe the effect that head rot (Botrytis sp.) may have had on the crop at time of harvest. Most fields observed had been harvested or were obviously past their prime. This rot was very prevalent on the older heads that had not been harvested for other reasons or were past their prime development.

Only one severe loss due to downy mildew (Bremia lactucae) was recorded. (Marion County March 27, 1943).

In large plantings observed in Marion and Multnomah Counties losses of 25-50% due to root rot (Sclerotinia sp.) were not uncommon. Sclerotia were evident at the base of many plants but other root parasites are suspected to have contributed to the loss. Many fields contained poorly formed heads for which the weather was commonly blamed. What part loss obvious root parasites may have played is problematic.

Aster yellows (virus) was found in Marion and Multnomah Counties. Loss was not great since the disease was not evident in most fields, and 6% was the maximum infection noted in any one planting. Evidence of this virus was recorded to occur in a seed crop in Malheur County but observed too late for satisfactory specimens.

Symptoms of spotted wilt (virus) were noted to occur on the Altuce variety grown in Curry County.

LYCOPERSICON ESCULENTUM, TOMATO. Late blight (Phytophthora infestans) was generally distributed along coastal areas and along river bottoms. Severe losses were observed in many garden plantings of less than one acre. In larger commercial plantings, the disease was checked by control practices.

Soil rot of fruit caused by undetermined species of Rhizoctonia, Fusarium and Cladosporium were noted where fruit came in contact with soil.

Characteristic symptoms of wilt (Verticillium sp.) were noted in most plants of a field (Lane County) where flood water had stood during early spring. With this exception, no severe loss due to this disease was noted.

Tip blight (virus) was prevalent in trial plantings in Jackson County. It is reported to be a limiting factor in the production of this crop in this area.

Curly top (virus) was recorded to have caused severe loss (15% infection) in a planting in Curry County.

Blossom-end rot (physiogenic) was noted in irrigated areas where crop was being grown on large scale for first time. Growers were not familiar with the crop and did not regulate irrigation properly. Losses as high as 25% were noted. This loss was not serious in such areas since production was in excess of the local market or processing facilities.

PASTINACA SATIVA, PARSNIP. Leaf spot (Ramularia pastinacae) was prevalent along coast and river bottoms and was also noted on volunteer plants. It appears to be more prevalent in late season. Loss in the root crop, if any, is not obvious.

PHASEOLUS VULGARIS, BEAN. Older plants affected by root rot (Rhizoctonia sp.) showed a characteristic mottle in the lower leaves. In some fields this varied from 3 to 5%. Apparently conditions had not been most favorable for development of this disease since reduction in yields evidently due to it was reported in very few fields by growers and field men for canning companies.

In some areas no control of rust (Uromyces phaseoli var. typica) has hitherto been considered necessary, but owing to severe individual losses and to greater prevalence of the disease, the producers are gradually becoming more aware of its potentialities and much interest has been shown in its control. It seems probable that an increased amount of inoculum is gradually building up in certain areas, thus causing the disease to become more evident during the earlier season of the crop. The over all loss due to this disease is not of large proportions as yet but may readily become so if facilities are not available to check it.



In general only traces of mosaic (virus) have been noted. Exceptions to this are in instances where an adjacent field either supplies an unusual number of vectors or some unsuspected source of inoculum. Mosaic has been noted to be severe in parts of plantings adjacent to gladioli.

SOLANUM MELONGENA, EGGPLANT. Fruit rot (Ascochyta lycopersici) was noted on mature fruit in a small planting in Benton County.

Wilt (cause undetermined) was noted along river bottoms in Lane County. No large plantings of the crop were observed. It is referred to locally as "Verticillium-like" but further study is necessary to check its identity.

SOLANUM TUBEROSUM, POTATO. Scab (Actinomyces scabies) is quite prevalent but generally not severe enough to greatly reduce the grade of tubers. Potatoes from a small area in southern Klamath County were in some cases well covered with scab. Apparently the soil in this area is particularly favorable for development of the disease since a short distance away the disease was less evident or less severe when it did occur.

Losses from late blight (Phytophthora infestans) were severe in garden plantings from Multnomah to Clatsop County and south along the coast. In some home plantings losses in the field and subsequently in storage were as high as 75%. In large commercial plantings the disease control practices held loss to a minimum.

More severe injury due to Rhizoctonia (Rhizoctonia solani) was noted in the lower truck crop and bulb areas apparently on land not commonly used for this crop. The Pellicularia stage was evident on the lower stems of many plants in certain fields. Examination of tubers from certain fields in Hood River area indicate the disease may have caused significant loss. Although generally prevalent no severe losses in large plantings were noted.

Ringrot (Corynebacterium sepeodonicum) was not noted during the survey of fields and storage. However, isolated cases of serious loss have been reported by inspectors. As a group producers seem to have a fear of this disease and are cooperative in checking its spread where it is discovered.

Blackleg (Erwinia phytophthora) was noted to be particularly severe in irrigated areas where improper use of water had tended to flood fields. In such fields, as high as 80% of the plants were obviously affected. In general only a small percentage of plants were obviously affected by this disease.

There was no opportunity to observe fields during the early season. Later, critical examination to determine the prevalence of virus diseases was not possible in many cases because of spray residues, masked symptoms, or presence of other diseases. Mild mosaic was prevalent and traces of calico were noted in scattered fields. Although by chance no severe cases of leaf roll were noted in the limited observation of fields, several cases were encountered during bin inspection later. The entire crop from certain fields was not marketable because of inability to separate necrotic tubers from others.

Basic data for estimate of losses due to specific diseases of the potato crop were not obtained. Growers that do not appreciate the efficacy of obtaining virus-free stock seldom are aware of the necessity for control of other common troubles. The prevalence of these diseases and magnitude of the losses they cause is perhaps best illustrated by the frequency that more progressive growers consider it necessary to obtain new foundation stocks of seed to maintain profitable yields. Although badly infested fields are obvious sources of inoculum, the source of inoculum often presents a somewhat confounding question.

SPINACIA OLERACEA, SPINACH. Leaf-spot (Heterosporium variabile) was recorded during June on the lower leaves of maturing seed crop in Lane County. No loss of crop was apparent. Blight due to Heterosporium sp. was very prevalent in December on young planting made for trial of seed crop in Coos County.

#### FRUIT CROPS

In addition to the more commonly prevalent diseases due to fungi and bacteria that are controlled by an intensive spray program, the development and spread of virus diseases presents new and different problems in practicable methods of control of diseases of orchard fruit. Losses due to these troubles are becoming more serious, and measures of control by registration of bud and nursery stock are being undertaken.

During contact with research workers in orchard areas, mention has been made of 12 different types of symptoms on cherries, and from 5 to 6 have been mentioned on peaches, plums, prunes, and apples. Many questions are unanswered regarding the character, spread, and methods of control of these troubles.

Several incidental observations are listed below:

AMYGDALUS PERSICA, PEACH. Brown rot (Monilinia (Sclerotinia) spp.) was observed on 100% of the fruit in an orchard (Lane County) where the spray had been lax. It was also reported to have caused blossom blight.

FRAGARIA, STRAWBERRY. Red stele (Phytophthora fragariae) has become one of the limiting factors in strawberry culture in this area. Yellows (virus) is very prevalent and a limiting factor in production of the crop.

MALUS SYLVESTRIS, APPLE. Scab (Venturia inaequalis) was very severe in small home plantings and on flowering species of crab apple where no spray program had been followed.

PRUNUS spp., CHERRY. Brown rot (Monilinia (Sclerotinia) fructicola) was reported causing fruit rot in Lane County. Leaf spot (Coccomyces (Higginsia) hiemalis) was reported in Lane County.

PRUNUS DOMESTICA, PRUNE. Rust (Tranzschelia pruni-spinosae) was observed to be very prevalent in an orchard in Linn County but occurred too late in the season to affect the crop.

PYRUS COMMUNIS, PEAR. Rust (Gymnosporangium libocedri) was reported from Lane County in June. Only traces of scab (Venturia pyrina) were noted in pear-producing areas. It was prevalent in small plantings where no spray program had apparently been followed.

RUBUS spp., RASPBERRY, BLACKBERRY. Rust (Phragmidium imitans) was observed in a late infection on raspberry that had caused no loss to the current crop. Leaf spot (Septoria rubi) was very prevalent in blackberries wherever spray program had been lax in Multnomah County.

#### SPECIAL CROPS

BETA VULGARIS, SUGAR BEET. Cercospora beticola, leaf spot, was prevalent but loss in the root crop was not obvious. Macrophoma sp. was recorded from Linn and Benton Counties. Severe lesions on leaves and stems of the seed crop were recorded in February. Peronospora schachtii occurred on flowers of the seed crop in only one instance (Benton County, June 18). Phoma sp. was recorded as severe on leaves of the seed crop. Further studies are

being made to determine the species. (Linn County, February 1943). Ramularia betae, during January and February, was recorded on from 60 to 100% of leaves in some instances. On the current crop only traces have been recorded as yet. In the current crop no apparent loss in root development has been recorded as due to infection by Uromyces betae.

HUMULUS LUPULUS, HOPS. There was opportunity to make only a limited survey of hop fields by either Mr. G. R. Hoerner or myself. Mr. Hoerner has kindly submitted reports he has received on about 15% of total acreage in this State, with the comment that these figures of loss are high because factors other than the particular disease mentioned are in part responsible for loss in yields.

Downy mildew (Pseudoperonospora humuli) was reported to have occurred in 3333 acres of planting. Of these 67% reported a significant crop loss, the average of which was approximately 20%.

Reports of "missing hills" (a non-specific trade term in part the result of diseases) from 932 acres average 14% loss.

Winter injury was recorded in small acreages in Marion and Polk Counties.

Sooty mold (Fumago sp. and Gladosporium sp.) are reported from a small percentage of the acreage without data regarding loss.

#### MISCELLANEOUS HOSTS

HELIANTHUS ANNUUS, SUNFLOWER. Stem-rot (Sclerotinia sclerotiorum) was very prevalent in small plantings noted along the coastal area.

LOLIUM PERENNE, RYE GRASS. Pullularia pullulans is causing severe loss in the area where this crop has been grown for seed. In Linn County the loss has been estimated to be approximately 85%. It is also found in Lane, Benton, Marion, Yamhill, and Clackamas Counties. (H. A. Schoth).

POPULUS sp., COTTONWOOD. Rust (Melampsora occidentalis) was noted on a few small trees in nursery in Douglas County.

RHODODENDRON OCCIDENTALE. Bud blight (Sporocybe azaleae) was very prevalent on buds of wild plants growing in woods along the southern coast.

TRIFOLIUM sp., CLOVER. Powdery mildew (Erysiphe polygoni) had not caused serious loss in white or alsike clover in Josephine County. It was very prevalent on clovers in pasture mixtures in Tillamook County. Considerable loss resulted to hay crops (red clover) in Multnomah County.

Rust (Uromyces trifolii) caused severe loss in small acreages of red clover in Multnomah County where infection was 100%.

ZEA MAYS, CORN. A trace of head smut (Sorosporium reilianum) was noted in one planting in Linn County.

ZINNIA ELEGANS, ZINNIA. Sclerotinia sp and aster yellows (virus) were recorded in Baker County, July, 1943.

PLANT DISEASE SURVEY IN WASHINGTON, 1943

Lytton W. Boyle

Acknowledgment is first due the staff of the Washington Experiment Stations for suggestions, and the staffs of the Washington Extension Service and Washington State Department of Agriculture for suggestions and assistance in location of crops for observation.

This report includes observations made until March 1944 on the 1943 crop as it was held in storage.

## VEGETABLE CROPS

APIUM GRAVEOLENS, CELERY. Leaf spot (Septoria sp.), or blight, was evident in all plantings of this crop observed. In general, control had been satisfactory. In King and Pierce Counties, this disease had made several small plantings unfit for harvest. In certain fields the result of poor coverage with the fungicides was evident by the differences in severity of the disease at regularly spaced intervals across the field.

Abnormal plants. Plants showing symptoms suggestive of virus infection were noted in every sizeable planting. In the self-bleaching types of celery, a chlorotic mottle was evident in the leaves. In both the green and self-bleaching types, a witches'-broom type of growth occurred in the heart. In severe cases this tended to form a rosette type of growth in the heart of the plant. There was a great variation between plants in the severity of symptoms. The average loss was estimated to be about 20%, depending on the market for poorer grades of celery.

BETA VULGARIS, BEETS AND MANGELS. Leaf spot (Cercospora beticola) was very prevalent on beets. Other leaf spots of undetermined cause were noted with it; apparently late-appearing since root development appeared to have been good. Specimens of beet and mangel leaves from Clallam County were well covered with rust pustules (Uromyces betae). Pustules on certain beet leaves were so parasitized that they appeared as leaf spots. (November 11).

BRASSICA OLERACEA var. CAPITATA, CABBAGE. Club root (Plasmodiophora brassicae) was very prevalent in older truck producing lands in Pierce and King Counties. An excess of lime had been placed in the soil about each plant in some fields, apparently to control this disease. In such badly infested bottom lands, it appeared questionable whether the addition of lime in this manner to the current crop had been of significant value. Excellent yields were obtained from new lands in this area producing a first crop of cabbage. These are reported to have exceeded 25 tons of kraut cabbage per acre. The crop from 15,000 Ball Head plants in Cowlitz County was not harvested because of fly speck (virus). An adjacent planting of Copenhagen Market was not affected. Plants showing veinbanding type of symptom were well scattered through a seed crop planting in Cowlitz County.

DAUCUS CAROTA, CARROTS. Black rot (Stemphylium radicum) (Alternaria radicina) was very prevalent and causing much loss in samples observed at processing plants and in storage in Yakima and Benton Counties. In some instances losses of 50% were noted in storage. Although commonly referred to as a storage disease, canners claim this trouble was evident in the first lots of roots received last fall. This would indicate the infection may

have occurred primarily in the field before harvest. Weakening or partial breakdown of the tissues due to improper water supply to the maturing crop or to certain soil deficiencies may have been contributing factors.

Soft rots due to undetermined organisms. In Yakima and Benton Counties, it had been necessary to hold much of the carrot crop in pits or storage until after March 15, 1944. During late February and early March the weather had been comparatively temperate. This was aggravating losses due to soft rots. Sunken areas were sometimes evident in the earth covered pits where roots were stored. The ultimate loss will depend on how readily an outlet for this crop is found.

LACTUCA SATIVA, LETTUCE. Head rot (Botrytis sp.), root rot (cause undetermined), and aster yellows (virus). Most of the lettuce plantings were not observed until late October. At this time the crop had been harvested from most fields. The percentage of plants left because of rot or poor heads was very large. In some plantings, losses of 50% were observed. Botrytis rot (called slime by growers) was very prevalent. Although critical symptoms were sometimes masked by rot, etc., aster yellows was suspected to have been primarily responsible for the poor condition of a small percentage of plants. The weather is commonly held responsible for such poor crops. However, when the overall picture is considered, the primary role of somewhat intangible root parasites can not be ignored. Root rots of various degrees of severity were evident on over half the plants in some instances. The general appearance of the roots was not distinct from rot caused by Sclerotinia sp., but sclerotia were not so prevalent at this time as in some other localities where this disease had been noted. These observations were primarily based on plantings observed in King and Pierce Counties.

PHASEOLUS VULGARIS, BEANS. Dark sunken necrotic spots appeared on the beans before picking. In the field there was no evidence of mold on the pods. After picking and remaining several hours in lug boxes, growth of Botrytis mycelium from the lesions was very rapid and deterioration due to soft rot was very rapid. Approximately 7% of the pods showed infection. The necessary hand labor to cull out infected beans made processing costly and slow. (Snohomish County).

Root rot (Rhizoctonia sp.). A trial planting made as a Smith-Hughes project of the High School students was free from rust or mosaic. About 4 tons per acre were obtained without irrigation. Traces of Rhizoctonia were noted in this planting. (Cowlitz County).

Russet (cause undetermined). Near Kent in King County mention was made of rust by certain growers of beans. Examination of fields did not show evidence of rust. A russet condition of the pods was found. No organism was found associated with the trouble, and evidence of injury due to spray or mechanical rubbing of the pod against a large stem or support for the plant was lacking.

RORIPPA ARMORACIA, HORSERADISH. White rust (Albugo candida) was scattered through a planting (20 acres) near Snohomish but was not causing serious damage.

Most of the plants in a large planting near Snohomish showed symptoms, of mosaic (virus) to some degree. In extreme cases all leaves showed a "fern" type of growth. Dark streaks were apparent along the larger veins and petioles. The vascular tissue of the roots was also necrotic in severely affected plants. This was also noted in small home plantings in King and Pierce Counties.

SOLANUM TUBEROSUM, POTATO. Scab (Actinomyces scabies) was severe on certain lots of potatoes observed in storage in Clark County. These would represent only a small percentage of the total production of this county. In so far as could be determined all these lots were the result of disease aggravated by the use of barnyard manure. Growers had noticed this relation but were referring to it as "manure scab" to differentiate it from the infectious type of scab.

A light infestation of late blight (Phytophthora infestans) was noted September 7-8 in fields in Clark and Cowlitz Counties. There was no opportunity to observe the fields at a later date, but reports obtained during February indicate that conditions favored the development of this disease before harvest and yields were very materially reduced. Storage rots due to this organism were not noted in large storage cellars.

Evidence of silver scurf (Spondylocladium atrovirens) could be found on nearly every tuber in certain lots of potatoes in Skagit County. Others appeared to be entirely free of the disease. From a limited number of lots observed it would appear as if nearly one-third of the fields were infested.

Ringrot (Corynebacterium sepedonicum) was not evident in the lots of potatoes observed west of the Cascades. Growers and inspectors reported losses due to this disease in this area, however. Traces of this disease were found in 2 lots of potatoes observed at grading warehouses in Yakima County. Commercial producers of potatoes seem generally aware of this disease and seem to fear it more than others, thus are generally cooperative in its control.

Storage rots. Dry types of storage rots due to Fusarium sp. were the more common west of the Cascades. Loss due to these may approximate 6%. Wet types of storage rots were not common except in incidental cases where ventilation and temperature control had obviously been poor. In the colder more arid area (Yakima and Benton Counties) loss due to storage rots were very low.

Internal bruise. Darkened spots of various intensity and size occurred from 1/16 to 1/2 inch beneath the surface of the tubers, rarely at the surface. Such spots were not evident in tubers in the storage pit at the farm. After transfer to warehouse, tumbling over and off the grader, and storage in the warehouse for several days, these dark areas were evident in a large percentage of the tubers. About 3 carloads of tubers were lost in this way. Apparently the large crisp tubers could not stand the fall from the grader and the jiggling necessary to settle them in the sacks before sewing.

Virus diseases. Sample fields noted in the Pioneer region of Clark County showed an average of 7% of mild mosaic. As high as 30% was noted in a field in Cowlitz County. Certain farmers refuse to try to grow the crop in this area. From observation of a few sample hills, this disease alone will probably reduce the normal yield by 25%. A comparable small planting from certified seed planted near the above field showed only 3% infected plants. Sample fields in the Pioneer region of Clark County showed from 2 to 3% current season infection of rugose mosaic. A field from home grown seed in Cowlitz County showed 15% rugose mosaic. A planting of certified seed in the same area showed none. Sample fields in the Pioneer area of Clark County showed 3 to 5% leaf roll.

Net necrosis assumed to be the result of virus infections was quite prevalent. No serious losses were observed west of the Cascades, but producers



report that such losses did occur. Certain producers comment that they believe this to be a major cause of loss, and it should be feared as much as ringrot and other diseases. Net necrosis was evident to some degree in a majority of the lots of potatoes observed in the Yakima and Benton County areas. Several lots of good size showed necrosis in 50% of the tubers. These are a total loss except as stock feed. It is estimated the yield of No. 1 grade potatoes was 22,500 tons less than would normally be expected from the acreage planted in this area.

Many producers of potatoes have learned the efficacy of using clean seed stock; but many small producers who should be producing for local markets, do not understand why some fertilizer or spray can not be used to cure these virus diseases.

SPINACIA OLERACEA, SPINACH. When fields were surveyed October 25th many had been disced into the ground. These were reported to have been lost because of downy mildew (Peronospora effusa) (P. spinaciae). Observation of stray plants missed in the cultivation indicated this to have been true. Evidence of the disease was found scattered through most fields observed. The loss will depend on how readily these may be marketed. Considerable acreage was lost in the Sammamish Valley on this account.

#### CEREALS, GRASSES, AND FORAGE CROPS

AGROSTIS TENUIS, BENT GRASS. A sample of seed grown near Winlock (Lewis County) contained a high percentage of sclerotia of ergot (Claviceps microcephala). (Specimen referred to herbarium for comparison).

AVENA SATIVA, OATS. No fields were observed before September 9. Most fields had been harvested. Fields noted on this date in Lewis County were badly affected by stem rust (Puccinia graminis var. avenae).

HELIANTHUS ANNUUS, SUNFLOWER. In Skagit County a planting had made excellent growth but about 20% of the stalks had fallen due to stem rot (Sclerotinia sclerotiorum). (September 17). Samples indicated that infection had been 100% in various degrees of severity on respective plants.

An extreme case of boron deficiency was noted in Clark County. In some cases the tips of the plants were black and blighted and no head was formed. In others, severe lesions extended from the head down the stem various distances. Turkeys were pastured in part of the planting. The manure from the turkeys had obviously aggravated the severity of the symptoms. Various fungi were found in the lesions but none with consistency that would indicate any primary relation to the lesions.

TRIFOLIUM PRATENSE, RED CLOVER. Attention was called to the poor condition of many plantings of red clover west of the Cascades. Rot and fungi were evident in these roots but appeared to be secondary to the infestation of insects. In fields over one year old, it was not uncommon to find the tunnels of insects in 100% of the roots observed.

#### FRUIT CROPS

AMYGDALUS PERSICA, PEACH. Attention was directed to a certain orchard of the Pacific Gold variety near Auburn. Much of the wood scattered through the orchard showed severe cankers. "A Cystopara sp. was readily isolated from these cankers. Dematium pullulans was also found in the canker, this however, is probably a secondary organism" (D. A. Preston). These cankers were causing severe injury to the trees. Leaf curl (Taphrina deformans) was

evident in small plantings noted in Thurston County. It had caused severe dieback on twigs. Small plantings of young trees in Thurston County were completely killed by a severe drop in temperature early in 1943.

FRAGARIA sp., STRAWBERRY. Sizeable plantings of strawberries have practically disappeared. The comment of growers and agriculturists is that red stele (*Phytophthora fragariae*) and yellows (virus) have made commercial production unprofitable. According to research workers on this problem, the prospects of obtaining resistant varieties with good quality fruit are encouraging.

PRUNUS DOMESTICA, PRUNE. Many prune orchards in Clark County have seen their best days. The general appearance of the trees suggested that root rot (*Armillaria mellea*) was the primary cause but sporophores were evident at this date for positive identification. Leaves at the top and outer branches of the tree were chlorotic and rolled. From 10 to 15% of the fruit had dropped. Large broken limbs were frequent. Mycelial warts of perhaps a secondary organism were evident in these. In some orchards frequent replacement of trees had been made. Such replacements were not growing well and the efficacy of their use seemed questionable. Either the root rot that probably caused the loss of the original tree was checking their development, or competition with older trees was too great.

RUBUS sp., BLACKBERRY. *Hendersonia rubi* (*Ascocarpa rubi*) was noted to be prevalent in certain plantings of blackberry in Pierce County. (Observations of this crop were purely incidental at the season when survey was made).

RUBUS sp., RASPBERRY. In King and Pierce Counties where isolated plantings of the Cuthbert variety were noted, the leaves were well infected with rust (*Phragmidium imitans*). Lloyd George and Washington were free from this disease. Mosaic (virus) was noted on Cuthbert variety and only traces were found. It appears that growers of this variety rogue quite a number of plants. Few plantings of this susceptible variety are found.

## PLANT DISEASE SURVEYS IN IDAHO 1943 - 1944

Earle C. Blodgett

### Introduction

In July work was begun on the Emergency Plant Disease Prevention program in Idaho. The writer was assigned the duty of securing as accurate and complete information as possible concerning the occurrence, severity and distribution of all plant diseases on all the agricultural crops in Idaho. Later the territory was enlarged to include the 13 counties of eastern Washington and Oregon which border Idaho. Great care was taken to make the coverage of the territory as complete and accurate as possible and still conserve travel facilities.

This report summarizes the results of the surveys. For the sake of convenience the summary is divided into parts. Two parts, on fruit diseases and on onion diseases, are included in this supplement, others will be published from time to time, as completed. It should be pointed out that this summary report makes no claim for completeness nor absolute accuracy.

The report may, however, draw attention to certain factors of importance heretofore neglected.

The writer wishes to express his appreciation to all who have helped secure the information: to growers, dealers, produce inspectors, Branch Station superintendents, Extension Agents and specialists, Seed Company and Sugar Company officials and fieldmen, research workers, and others and especially to those who have critically read the manuscripts.

A great deal of credit and sincere thanks go to Dr. W. W. Ray and Mr. D. A. Preston, Emergency Plant Disease Prevention Project, Stillwater, Oklahoma, for their diagnosis and determinations on over 100 plant disease specimens (up to April 5, 1944). In the various parts of the report credit for diagnosis will be given also to others who assisted in the work.

Since the counties of Oregon and Washington bordering Idaho practice the same type of agriculture in the respective districts and the problems involved are similar. This is especially true of the Snake River Valley in southwestern Idaho and eastern Oregon. Onions, celery, beans, hay, sugar beets, carrots, many seed crops, fruit and potatoes are raised, stored, and shipped in the two states much as from a single community. This is true also in the Lewiston-Clarkston area, the Spokane-Coeur d'Alene Section, and in the Palouse area.

The cooperation of the Departments of Plant Pathology, Agricultural Experiment Stations, in Idaho, Oregon, and Washington respectively is gratefully acknowledged.

The 1943 season was characterized by a long, cool, wet spring followed by a long, dry, warm fall. Summer temperatures were not far from normal--possibly somewhat below.

## PART I: FRUIT DISEASES IN IDAHO IN 1943

The following list of fruit diseases has been compiled from the records of inquiries and of field observations on the occurrence and prevalence of these diseases during 1943. Most of the notes were made during field trips of June 7 - 19, while the writer was connected with the Idaho Agricultural Experiment Station, and since July 26, in many field examinations in connection with surveys of the Emergency Plant Disease Prevention Project. The list is complete only in that it includes all diseases observed in 1943. The report is similar to those for 1936-1942, published in various volumes of the Plant Disease Reporter.

### Parasitic Diseases

1. Coryneum blight (Coryneum carpophilum) (C. beijerinckii) of peach was prevalent and particularly severe on fruit in large orchards near Wendell and Buhl. These were old trees where twig cankering was very slight. The disease is particularly serious in small orchards along the Clearwater and Salmon Rivers where cankering is the predominant phase.

2. Coryneum blight of apricot was commonly present.

3. Coryneum blight was noted on sweet and sour cherries at Lewiston but damage was less than last year. Leaf spotting was prevalent in Moscow.

4. Coryneum blight caused extensive fruit and leaf spotting at Moscow on Italian prune. Typical cankers were noted on suckers of Prunus cerasifera under infected Italian prune trees. This represents the first report

of Coryneum carpophilum (C. beijerinckii) on this host in Idaho.

5. Powdery mildew (Podosphaera spp.) was noted on apple but much less severely this year.

6. Powdery mildew (Sphaerotheca mors-uvae) of gooseberry and red current was very severe on the planting at Moscow. Apparently it was more severe than usual near Craigmont also.

7. Powdery mildew (S. pannosa) on peach and nectarine was common and noted in orchards apparently not infected before. In an orchard at Emmett very severe leaf and twig infection was seen but no lesions on fruit were found.

8. Fireblight (Erwinia amylovora) on pears showed the strangest behavior ever noted in the State. In a large orchard, 20 acres or more, near Marsig a very good crop was harvested. This orchard, planted about 1934, was nearly killed out in 1936-37 by fireblight but it was left and since then has encountered mild outbreaks correlated with spring infection. Only a trace was noted in June, 1943. In September, this orchard and one at Fruitland, where frost killed all the blossoms, presented an extreme development of fireblight. Nearly all the damage was apparent after harvest time and dying of branches and whole trees occurred rapidly during September and October. The injury is so severe that saving these orchards seems impossible. Although the writer did not have an opportunity to follow the cases closely, he cannot account for the difference in behavior. The summer was extremely dry and no rainy periods occurred previous to the outbreak this fall.

9. Apple trees, particularly Jonathan, showed considerable injury from fireblight; an orchard at Franklin was severely affected by blossom blight.

10. Perennial canker (Neofabraea perennans) fruit rot was noted on Rome Beauty apple fruits at Moscow.

11. Leaf curl (Taphrina deformans) of peach was very common in northern Idaho but less prevalent than last year in southern Idaho.

12. Leaf spot, cane canker, and die back (Septoria spp.) of brambles was noted at Parma, Whitebird, Midvale, and Moscow. In some cases severe injury resulted in dying of canes.

13. Currant anthracnose (Pseudopeziza ribis) caused extensive leaf fall and fruit spotting of red currants at Moscow (plots). Again this year no infection was noted on gooseberry plants near by.

14. Strawberry leaf spot (Mycosphaerella fragariae) was noted at Tamarack.

15. Strawberry leaf scorch (Diplocarpon earliana) was also noted at Tamarack.

16. Blue mold rot (Penicillium expansum) was common on many hosts including cherry, apple, pear, and prune.

17. Black mold rot (Rhizopus nigricans) was observed on cherries, prunes, and apples. It was very severe on peaches at Wilder. Strawberries also were affected.

18. Botrytis rot (Botrytis sp.) was noted on strawberries.

19. Apple scab (Venturia inaequalis) was generally present in northern Idaho. It was very severe in many cases and did much more damage than usual.

20. Brown rot (Monilinia sp.) Sclerotinia sp.) was noted at Lewiston on cherry fruits.

21. Powdery mildew (Uncinula necator) was severe on 2 plantings near Kenrick and Juliaetta. The occurrence of this disease is not common on grape in Idaho.

22. Crown gall (Agrobacterium tumefaciens) was noted causing extensive damage to boysenberry canes near Weiser (Mann's Creek).

### Non-Parasitic Diseases

1. Winter injury probably was of very minor importance. The relation of this factor to gummosis and death of young cherry and apricot trees is still undetermined.

2. Drought spot of prunes was noted but appeared to be no worse than usual.

3. Cracking of sweet cherries was noted but was not so serious this year.

4. Lime-induced chlorosis is a very important factor in tree and small fruit plantings in southern Idaho and generally is on the increase. It was noted on apples at Burley, on fruit trees at Malad, and several trees and shrubs at Preston.

5. Spray injury was not an important factor this year. In an orchard at Twin Falls, however, a grower sprayed chlorotic Jonathan trees with about 1% iron sulfate solution in the calyx stage and again later with 0.5%. Russeting was severe on some fruits and injury was rather prevalent. The trees showed much better colored foliage, however.

6. Systemic arsenic toxicity injury to peach appeared to be about as severe as last year.

7. Rosette of apples noted at Payette, Hagerman, and Malad is on the increase in these orchards.

8. Damage from frost was very severe this year. In several prune orchards fruit showed an odd, freckled appearance when the epidermis of nearly mature prunes began to loosen and scale off in spots. On apples, russet and frost bands were common. On nectarine at Emmett, deep cracks--clear to the pit--developed on fruit that had been frosted. This was the first case noted of this type of injury. Some fruit, grotesquely disfigured by frost, matured.

### Virus Diseases

1. Raspberry mosaic (types not separated) was about the same as usual. One large planting of Newburgh at Georgetown showed severe mosaic infection.

2. Cherry mottle leaf was observed about usual. One Windsor tree near Caldwell showed what is believed to be mottle. Symptoms were severe and the grower reported that the tree had always been affected.

3. The original peach mottle tree was removed during the winter, but in June an apparently similar case was found in an orchard at New Plymouth. No connection between cases could be inferred. The mottle on certain peach wart trees has persisted.

4. Peach wart was present as usual and a few new cases were found, one at New Plymouth, one at Fruitland, and one at Parma.

5. The Western-X disease continued to show a spread and increase generally in severity. At the same time, its erratic behavior was apparent.

6. No new cases of rasp leaf of cherry were found.

7. Peach calico (transmissible) was observed again on the original tree where previously healthy branches showed striking fruit symptoms.

8. Leaf deformity of Italian prune (2 trees) at Fruitland noted last year has been shown to be transmissible. In general, it resembles the effects of Prunus virus 6 but causes no symptoms on peach. The late foliation of

several trees noted last year continued apparent this year.

### Miscellaneous Diseases--Causes Undetermined

1. Italian Prune: (a) Leaf curl was more severe this year than last and considerable injury was noted. Some trees, however, apparently recover. (b) Leaf spot was as wide-spread as usual. In one case recovery was indicated by zinc sprays applied in the dormant stage but check trees also showed some recovery. (c) The chlorosis and malformation of prune foliage in the orchard at Weiser still persists. (d) The leaf deformity noted last year has been shown to be transmissible (see virus diseases).

2. Apricot: (a) The development of cankers on trunks and main branches was again noted and the damage was fatal to many trees. (b) Physiological spotting of fruit was noted as usual.

3. Cherry: (a) Further budding tests fail to reveal any connections between red-leaved chokecherry trees and Western-X-infected peach trees. (b) An odd ringspot pattern on sweet cherry leaves was noted at Payette. (c) A pucker-leaf condition was found in sweet cherry trees at Payette and appeared at first to be correlated with frost injury. It was seen, however, that new, young leaves showed the same symptoms. (d) Preliminary tests show that the cherry rough-bark, canker type of injury noted last year, (f) is capable of causing disturbance in young peach trees by bud inoculation. Trials are being continued. From tests completed it appears that cherry lace-leaf as known in Idaho is transmissible.

4. Peach: (a) Rough bark is very prevalent in one orchard and seems in most cases to be associated with reduced vigor. (b) Bark splitting was noted as usual. (c) Rusty spot was rare this year and the original orchard at Mesa has been removed.

5. Apple: (a) A peculiar injury to apple fruit (Delicious variety mainly) at Whitebird was noted for the second year. It appears much like drought spot (boron deficiency) on the fruit but is not typical. Boron applications and bud inoculation tests have been made. (b) A peculiar rough-bark condition in definite areas on wood of a seedling apple tree, 68-15, (selected and propagated) at Parma has been observed for several years. Cankers apparently do not show up except on 3-year or older wood. Budding tests have been started.

6. Grape: The plants of Seneca and Golden Muscat at the Parma Branch Station plots showed an unidentified leaf spot that caused extensive necrosis of leaf tissue. No other varieties of several in the plots showed the condition. Probably soil differences and faulty nutrition may account for the leaf spot.

### PART II: ONION DISEASES IN IDAHO

Over a period of many years market onions have been one of the most important cash crops grown in the State. Acreage and production figures for recent years are shown in the following tabulation:\*

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\* This information is furnished through the courtesy of the office of Richard P. Ross -- Agricultural Statistician--Boise, Idaho.



Onions	Acreage harvested	Yield sacks	Production sacks
1935-1939 Av.	2620	345	903,600
1942	3400	250	850,000
1943	3300	260	858,000

Onions are grown extensively in the Snake River Valley from Weiser to the Twin Falls area. Production of onion seed has increased very rapidly in this general area during the past 4 years and Idaho now ranks near the top. The above figures do not include bulbs planted for seed production which in 1942 involved over 1100 acres.

Inquiries on diseases and observations in the field have indicated that the growing bulb crop has been comparatively free from limiting diseases. The marked reduction in yield in 1942 and 1943 under that of 1935-39 cannot so far as known be charged, except perhaps in small measure, to the presence of parasitic diseases. Various forms of root rot have been noted on seed bulbs but in most cases, diagnosis was not possible.

Onions in storage, however, have in some cases been seriously damaged by several types of rots and during the survey, special attention was given to diagnosis of these diseases. More concern was shown during the past season because onions were stored rather longer periods for dehydration use and many bulbs were kept over for seed crop planting. These factors together with good prices and inadequate storage facilities increased interest regarding causes of the losses. Several cases were noted where damage from rots amounted to 30 or 50% of the crop stored.

The following diseases have been observed during the survey of onion storage and processing plants:

1. Neck rot. (Botrytis allii) (Confirmed by KenKnight and Ray) was the predominant and most widespread of all the rots encountered. Losses ranged from slight to well over 50% in some lots. Although no comparative determinations were possible, the yellow varieties as well as whites were severely injured. From observations it appears to the writer that Botrytis rot of onions is initiated either actively or potentially in the field and that crop rotation has a great deal to do with loss from this disease. Of course bulb maturity, weather conditions, handling and especially storage conditions are important factors.

2. Mycelial neck rot. (Botrytis byssoidea) (Diagnosed by Ray) was found on white set onions at Moscow but was not very prevalent. This apparently represents the first report of this disease from Idaho.

3. Small sclerotial neck rot. (Botrytis squamosa) (Diagnosed by Ray) was found sparsely in white set onions at Moscow and caused severe loss in one lot of white onions near Filer. This apparently represents the first report of this disease from Idaho.

4. Basal bulb rot (Fusarium moniliforme) (Diagnosed by Ray) was consistently found on decaying onions characteristically as a root or plate rot, and was peculiarly associated with a particular type of bacterium; sometimes with Botrytis allii. This apparently represents the first report of this disease from Idaho.

5. Penicillium rot. (Penicillium sp.) (Confirmed by KenKnight and Ray) was found fairly commonly and appeared to be an active parasite. So far as known this appears to be the first report of this disease from Idaho.

and indications are that its occurrence elsewhere is uncommon.

6. Black mold. (Aspergillus niger) (Diagnosed by KenKnight) was noted on bulbs collected at Fruitland.

7. Soft rot. (Erwinia carotovora) (Diagnosed by KenKnight) was noted in bulbs at the Caldwell dehydrating plant. Many of the bulbs had one to two or more leaves in a band anywhere in the bulb that were brown, water-soaked, and completely rotted. They extended from the neck to the root plate and made a striking contrast between affected and healthy tissue.

8. Sourskin. (Botrytis allii). (Diagnosed by KenKnight) (and confirmed by Ray). In the same lot noted above (under 7) many bulbs were affected by what is popularly known as sourskin. In these cases the outer scales were watery, brown, and rotted, but the inner tissues were unaffected and there was no apparent connection between sourskin and neck rot. It would appear then that considerable variation occurs in symptoms of this disease (including neck rot and sourskin, unless great differences in fungus strains occur). Double onions seemed to be particularly affected.

9. Soft, puffy rot, was noted in several cases and Ray isolated a bacterium of dirty white color that when inoculated back into onions produced a soft rot. He stated that "this bacterium may be Pseudomonas allii as described by Burkholder." Fusarium moniliforme also was associated in this case.

The same soft, puffy rot condition was noted rather consistently on onions that did not survive the winter (fall planted bulbs for seed production).

10. Scaly onions. This peculiar condition on onion bulbs of several varieties was seen in many storages. It was characterized by the breaking away of the scales near the root plate after which the scales turned dark and surface molds (mostly Penicillium) were common. One could sort lots by noting the darker color of scaly bulbs. In extreme cases, often accounting for 30% of the onions in a lot, the bulbs were nearly peeled and exposed the under leaves. Naturally shrinkage was more rapid and rots seemed to be more prevalent. One field had been noted August 24 near Huston where a darkening of the outer skin was recognized but no damage otherwise was noted. At Fruitland in a storage containing over 50,000 bushels, the onions from part of one lot were sorted on December 4 and each portion stored in a box. On February 16, 1944 the onions were sorted again as follows:

	<u>Box 1 - Normal Onions</u>	<u>Scaly Box 2- onions</u>
Original onions December 4	60	62
Sound onions February 16	54	48
Mild neck rot	3	7
Severe neck rot	3	7

In seed onions a great deal of concern was expressed over blasting of the heads and poor yield. Although some observations were made, indicating, as pointed out by KenKnight (PDR 28:191-198. 1944), that root rots might be involved, no conclusive evidence was found.

Several interesting cases in onion storages were noted and the most unusual seen was a large building, 1 to 3 feet off the ground, with an open slat floor in which about 30 cars of onions were stored in 50 pound mesh

sacks. No heat was available and the only protection was on the sides and roof to keep out rain and snow. When these were examined about mid-January the bulbs were frozen solid as they had experienced about 0° F in an extended cold period. At that time one sack near the entrance was examined and about 10% neck rot was noted.

On March 23 the storage was examined again and shipping was well along. The onions had kept well, thawed out gradually, and little loss had resulted. It was unnecessary to re-sort. An occasional sack showed considerable rot but much less total rot than in most storages examined.

In most cases where onions were stored in potato cellars (whether with potatoes or not) rot was severe and in a few cases approached 50% or more. From observations it would appear that more attention should be paid to onion storages in southwestern Idaho. Good facilities are not available to handle even normal-size onion crops. As rotation practices are neglected it appears likely that infection by neck rot, Fusarium bulb rot and other diseases are due to increase materially and unless conditions are proper, disastrous losses may occur during extended storage periods.

The writer cannot help calling attention to the dangers of introducing diseases into Idaho when onion bulbs are shipped in from many sources for seed production. Yields may be higher in some cases but from the principles of disease control the practice should be strongly discouraged and seed companies might well exert their influences to prevent introduction of out-of-State bulbs.

The experiences of some seed companies in overwintering onions, particularly Yellow Sweet Spanish bulbs, for seed production emphasizes the need for more information on and better attention to known principles of onion storage.

